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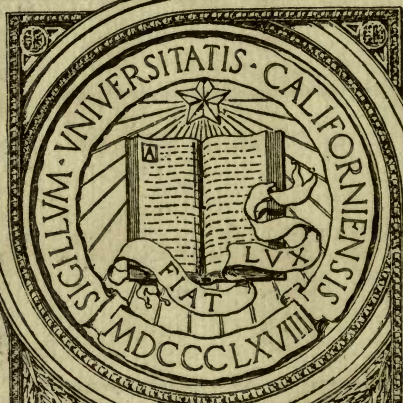


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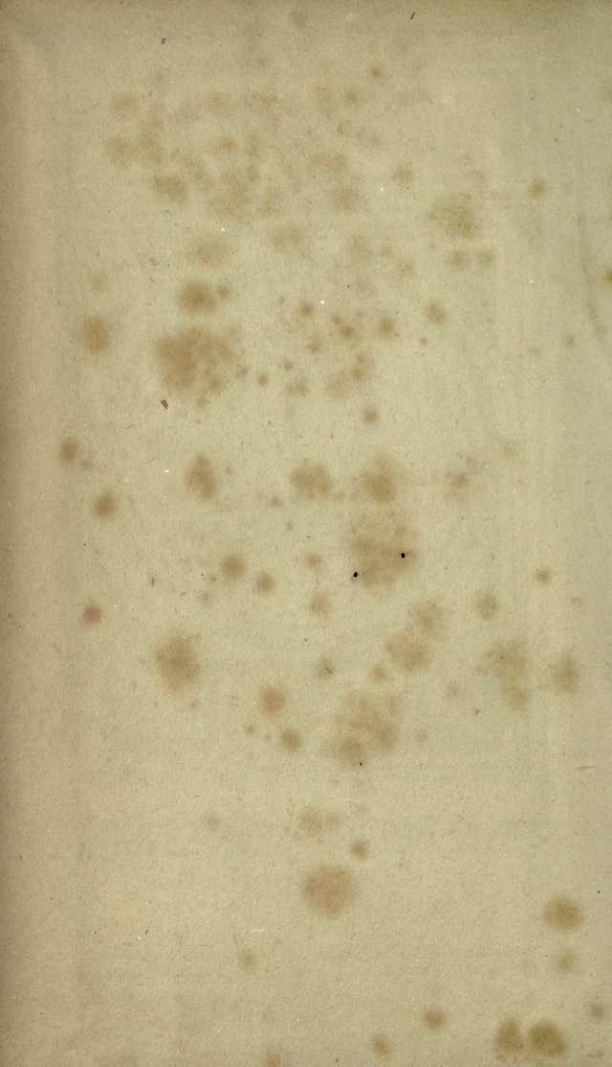


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THE
YOUNG BOTANIST:

BEING A

TREATISE ON THE SCIENCE,

PREPARED FOR THE

USE OF PERSONS JUST COMMENCING THE

STUDY OF PLANTS.

BY J. L. COMSTOCK, M. D.

FOURTH EDITION.

COLUMBIA

NEW YORK:
PRATT, WOODFORD, & CO.,
No. 4 CORTLANDT-STREET.
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ADVERTISEMENT.

Soon after the publication of the *INTRODUCTION TO BOTANY*, the author perceived the want of a treatise on the same subject of a smaller size, and more especially adapted to the situation of those who commence the study without the aid of an instructor.

The design of preparing such a work, though kept constantly in view, the author did not for years find time to execute; and now when the little volume is about to take its chance before the public, he cannot but hope that the beginner in Botany, whether adult, or youth, will find it an acceptable guide.

Under the head of *PRACTICAL BOTANY*, the learner will find popular descriptions of the most common plants, following their generic and specific descriptions in scientific terms. This portion of the work, it is believed, will be peculiarly acceptable to those who have not time or inclination to learn the meaning of all the terms usually employed in descriptive Botany; and to this part of the book we would advise the practical student to direct his early attention.

The chapter on the *EXAMINATION OF FLOWERS*, is especially designed for those who are determined to learn the science of

Botany, and the names of plants without personal assistance, and to this part therefore, the student ought to direct his attention, whenever he goes into the field for the collection of specimens.

The GLOSSARY will be found to contain an explanation of most, if not all, the terms, usually employed by recent authors in the science in question.

HARTFORD, CONN., March, 1850.

RULES

For Pronouncing Botanical Names.

VOWELS.

IN classical words, there are as many syllables as there are vowels except when *u* with any other vowel follows *g*, *q*, or *s*, and when two vowels unite to form a diphthong.

Every accented penultimate vowel is pronounced long, when followed by a vowel or a single consonant, as Achille'a tomento'sa; but it is shortened when followed by two consonants, or a double one, as Sórbus, Táxus, except when the first consonant is a mute, and the second a liquid, as A'brus.

A, when unaccented, and ending a word, is pronounced like the interjection *ah*, as Dirca, Septaria.

E, final, with or without a preceding consonant, always forms a distinct syllable, as Chelo'ně, Sile'ně, A'loě; also when the vowel is followed by a final consonant, as Trichó-ma-nes, not Tricho-manes, Vas-cu-la'-res, not Vascu-lares, Cel-lu-la-res, not Cel-lu-lares.

I, when ending a syllable, not final, has the sound of *e*, as Mespilus, (*Mespelus*,) Artimi'sia, (*Ar-ti-me'-sia*,) Epilo-bium, (*Epilo-be'-um*.) In words ending in *ii*, the same rule is observed, as Smithii, (*Smithě eye*.)

The diphthongs *æ* and *œ* conform to the rules for *e*, as Spiræ (*Spi-re-a*.) Diœcia, (*Di-e-cia*.)

CONSONANTS.

The consonants *c* and *g* are hard before *a*, *o* and *u*, as Coptis, (*Koptis*;) but they are soft before *e* and *i*, as Geum, (*Jeum*,) Gillenia.

X RULES FOR PRONOUNCING BOTANICAL NAMES.

Ch before a vowel sounds like *k*, as *Chelidonium*, (*Kelidonium*,) *Chelo'ne*, (*Kelone*.)

Cm, *cn*, *ct*, *gn*, *gm*, *mu*, *tm*, *ps*, and *pt*, when they begin a word are pronounced with the first letter mute, as *Pt'eris*, (*Teris*,) *Cnicus*, (*Nikus*,) *Gmelina*, (*Melina*,) *Gnidia*, (*Nidia*,) &c.

Sch sounds like *sk*, as *Schoenus*, (*Skenus*,) *Schubertia*, (*Skubertia*.)

X at the beginning of a word is pronounced like *z*, as *Xanthium*, (*Zanthium*,) *Xyris*, (*Zyris*.)

YOUNG BOTANIST.

1. THE English word *Botany*, comes from the Greek *Botane*, which signifies a plant.

2. Botany is a science which conveys a knowledge of the whole vegetable kingdom, or of every kind of plant found on the earth.

3. Under the general name of *Plants*, is included all *Trees*, *Shrubs*, *Herbs*, *Grasses*, *Mosses*, *Sea-weeds*, and *Mushrooms*.

HOW PLANTS DIFFER FROM ANIMALS.

4. In pointing out the difference between plants and animals, perhaps one of the first distinctions that strikes the mind, is that plants are fixed in their places, while animals are free and move wherever they choose.

But this, though a most obvious, and in general a true distinction, is not always so, for while the Oyster, and many other species of shell fish, are fixed to their places, there are several plants which are not attached to the earth, but

1. What does the term Botany mean?—2. What kind of knowledge does the science of Botany convey?—3. What are included under the general name of plants?—4. What is the most obvious difference between animals and plants?

either float on the surface of the water, or grow on other plants, and therefore can be moved without injury.

5. Some animals, indeed, so nearly resemble certain plants in appearance and habits, that it has been a question among naturalists, whether they belong to the Animal or Vegetable kingdom.

This is the case with the Sponges, and several other productions of the sea, which though found in reality to possess a low degree of animal life, or at least, are composed of animal substances, are still fixed to the earth, and in their form and growth most resemble plants.

6. It has been proposed to distinguish animals from plants, by the want of sensibility or feeling in the latter, while animals show signs of pain when injured, or at least shrink away from the touch. Thus the *Oyster*, if touched when his shell is open, instantly draws itself in and closes his shell.

7. But although plants show no signs of pain when wounded, like the more perfect animals, still like the *Oyster*, some plants, when touched, shrink away from the offending cause. This is the case with that species of the *Mimosa*, called the *Sensitive Plant*, which being touched in the slightest manner, moves its leaves away from the intruding hand.

5. What is said of animals fixed in their places, and moving plants?—6. What is the general distinction between plants and animals?—7. What is said of the similarity of circumstances under which plants and animals live and die?

8. In general, however, animals may be distinguished from plants, by the power of self-motion and the sensibility of the first; and the insensibility and fixed state of the last.

But notwithstanding this general distinction, if we examine the circumstances under which animals and plants live and grow, and those under which they are destroyed, we shall find that at least, in many cases each partake of the influence of the very same causes.

9. Thus if an animal be deprived of air, it soon perishes, and if a plant be treated in the same manner, the same result follows. The only difference in this respect is, that the plant, being insensible, has a greater tenacity of life and will sustain itself longer without air than the animal.

10. Plants, too, like animals, are killed by poisonous substances, such as prussic acid and arsenic.

11. There is also reason to believe, that perpetual light would be unfavorable to the growth and health of plants, as well as to animals, and that during the night the former fall into a state resembling the sleep of the latter.

12. It is certain that the Sensitive Plant, during the night, has a relaxed, or wilted ap-

8. How may animals generally be distinguished from plants?—9. What similarity is there between animals and plants with respect to the necessity of air?—10. What is the effect of poisons on plants?—11. What is said of the effect of perpetual light on plants?—12. What is the state of the sensitive plant during the night, and what is the effect of light upon it, when in this state?

pearance, the leaves being folded together, and the leaf stalks drooping. This also takes place in the day time, whenever the light is entirely excluded; but on letting in the rays of the sun, the plant seems to awake out of sleep, and putting itself in motion, spreads out its leaves, and erects its small branches, which before were drooping. The same effect is produced in the night, when a strong light is carried into the room where these plants are sleeping; they arouse themselves like living creatures.

13. Plants are furnished with minute pores or vessels, through which their juices circulate. One system, or set of these vessels, carries the sap up from the roots to the leaves, while the other set returns it from the leaves to the roots.

These vessels appear to correspond to the veins and arteries of animals; for if a plant be deprived of its sap, it as certainly dies, as does an animal if deprived of its blood.

14. We see, therefore, that plants resemble animals in many particulars, but it will be observed that it is chiefly with respect to the lowest, and what are considered the most imperfect orders of animals, and the most perfect kinds of plants, between which these resemblances can be traced, and here it would seem that the animal and vegetable kingdoms nearly approach each other, or perhaps meet.

13. What vessels have plants corresponding to the veins and arteries of animals?—14. What orders of plants and animals have the most resemblance to each other?

15. In most points, however, animals differ widely from plants. Plants have neither mouths nor stomachs; hearts nor brains; neither have they lungs, nerves, or muscles. Hence they have no sensation properly so called, nor digestion, nor can they move themselves at will, like animals.

DIVISION OF PLANTS.

16. Plants may be divided into three kinds, namely, into *Trees*, *Shrubs*, and *Herbs*.

17. (1.) TREES are the largest of plants. Their stems are perennial, that is, perpetual, or continue for many years, and sometimes even for several centuries, during which time they increase in size and height.

18. Trees are commonly branched towards the top, as the *Oak*, *Willow*, and *Pear*.

19. (2.) SHRUBS, are small trees having perennial stems, and are often branched at the ground as well as towards the top, as the *Elder*, *Lilac*, and *Quince*.

20. (3.) HERBS, are annual plants, their stems every year perishing, and during the winter decaying down to the root, as the *Grasses*, and most *Garden Flowers*.

15. In what respects do plants and animals differ?—
16. How may plants be divided?—17. What are trees?—
18. Give an example of trees.—19. What are shrubs?—20.
What are herbs?

21. Some plants have perennial roots, and annual stalks, that is, the roots continue alive in the ground through the winter, and send up the stalk and leaves in the spring, which perish in the autumn. Such are the *Lily*, the *Grasses*, and *Rhubarb*.

22. Others are strictly annual, or perish, both root and branch every year, as *Indian Corn*, *Cucumber*, and *Bean*.

23. Others again are *biennial*, or continue two years, producing their flowers and seed the second year, and then perish, both root and stalk; such are the *Beet*, *Parsnip*, and *Cabbage*.

24. All these plants have,—1. Flowers,—2. Flower-stalks,—3. Branches,—4. Leaves,—5. Stamens,—and 6. Roots.

These several parts we intend to describe and illustrate by figures, so that the young student in Botany, may be able, not only to distinguish them, but also to understand their uses, and the relations in which they stand to each other in forming the whole plant.

We shall begin with the flower because this is the most attractive part of the plant, and that on which the young Botanist sets the highest value. It is also the most important part to the beginner, as on it depends the classification of the plant in the scientific arrangement.

21. What kind of plants have perennial roots and annual stalks?—22. How long do annual plants live?—23. What are biennial plants, and what examples of these plants are given?—24. What are the different parts of plants?

THE FLOWER.

25. The Flower or blossom, is generally the most showy and beautiful part of the plant, and is the chief object of the cultivator.

26. The Flower consists of several parts, each of which has a distinct name, and which it is quite necessary that the student should be able to designate under different forms and colors, since these parts vary in different species of plants.

These parts are the *Calyx*, the *Corolla*, the *Stamens*, and the *Pistil*.

Fig. 1.



27. The *Calyx*, or *flower cup*, Fig. 1, is the external, and if the flower stands erect, its lower part.

28. Within this the blossoms or petals are placed.

29. The calyx is commonly of the same color with the leaves, and of the same texture.

This part has a great variety of forms, being different in the different orders of plants.

30. Sometimes it is composed of several distinct pieces, called *sepals*, while in other plants it is composed of only a single piece.

25. What is the flower?—26. What are the different parts of the flower called?—27. Where is the calyx situated?—28. What part is placed within the calyx?—29. What is the color of the calyx?—30. When it is composed of several pieces, what are they called?

Fig. 2.



31. The *Corolla*, Fig. 2, is the delicate, colored part of the flower, and generally consists of several pieces called *petals*. It is situated within the calyx, and constitutes the chief beauty of most flowers.

32. It is of various colors in different plants. In the Red Rose it is red, and consists of a great number of petals. In the Morning Glory, it is of a single piece, and is of various colors in different plants, as red, purple, blue, or white.

The positions of the calyx and corolla with respect to each other, are represented by Fig. 3.

Fig. 3.



33. It will be seen that the calyx occupies the lower, and outer portion of the flower, being that part to which the stem is attached. In the Apple and Quince, the calyx still adheres to the fruit, but in many flowers it falls off soon after the petals expand. In a few instances, the calyx is the most showy part of the Flower, and

by the young Botanist would be mistaken for the corolla.

31. What is the corolla?—32. What is said of the colors of the corolla?—33. In Fig. 3, which is the calyx, and which the corolla?

Fig. 4. 34. The *Stamens*, Fig 4, consist of two parts, viz: the *anther*, *a*, and the *filament*, *b*.

35. The anther is the essential part, the filament merely serving to elevate it to the height of the pistil, the part to be next described.

36. The filament is sometimes entirely wanting, in which case the anther is situated on the *germen*, a part to be described directly.

37. The anther contains the *pollen* or dust, without the presence of which, the seeds of plants do not ripen, and therefore will not grow.

Fig. 5. 38. The *Pistil*, Fig. 5, consists of three

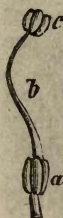
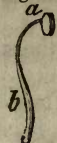
parts, namely, the *germen*, or seed bud, *a*, which is the rudiment of the young fruit; the *style*, *b*, which is attached to the germen, and serves to elevate the *stigma*, as the filament does the anther.

39. The stigma, *c*, is the third part, and like the anther is absolutely essential, because it receives the pollen, without which the seeds will not come to perfection.

40. In some plants the style is wanting, in which case the stigma is situated on the germen as in the *Common Poppy*.

Fig. 6. 41. The position in which the *stigma*, *styles*, *anthers*, *filaments*, and *germen* are situated, with respect to each other, are shown by Fig. 6, which is a drawing of the *White Lily*, with the corolla removed.

It will be observed that the pistil is surrounded by the stamens, in the



midst of which it stands, and that the germen is included within the filaments.

The stigma crowns the style, as the anthers do the filaments.

We have thus described each part of a Flower separately, so that the young pupil will, it is hoped, be able to distinguish them separately. If he will take a Lily, and with a pair of scissors cut off the different parts in succession, comparing each with the above drawings, he will in a few minutes be enabled to name them, and describe their several positions without reference to the book.

Fig. 7.



42. The different parts of the Lily are assembled in Fig. 7, so that the pupil can observe how they are severally situated, with the exception of the calyx, which is wanting in this flower, and therefore could not properly be represented. The position of this part, when present, will be understood by Fig. 3.

34. Of what parts do the stamens consist?—35. Where is the anther situated?—36. Which is the essential part, the filament, or anther?—37. Why is the anther essential?

THE CALYX.

The above description applies only to the most simple kind of Calyx. In the different species of plants, this part has a variety of forms, and which it is therefore necessary to illustrate by additional diagrams and descriptions.

43. The Calyx has received different names, depending on its situation, or form, of which the following are examples.

1. PERIANTH.

Fig. 8.



44. This term is derived from the Greek *peri*, about, and *anthos*, a flower.

45. It is that kind of Calyx which closely embraces and surrounds the petals.

46. Of this Calyx, the Pink forms a common and good example.

47. This Calyx is *monophyllus*, or single-leaved, this term being derived from the Greek *monos*, one, and *phullon*, a leaf. The proper

38. Of how many parts does the pistil consist? How are these parts situated with respect to each other?—39. What part of the pistil is essential, and why is this an essential part?—40. When the style is wanting, where is the stigma situated?—41. Point out by a flower, or by Fig. 6, which are the different parts of a flower, there represented?—42. Which is the corolla in Fig. 7?—43. On what do the different names of the calyx depend?—44. What is the origin of the word perianth?—45. What sort of a calyx is the perianth?

Calyx, *a*, Fig. 8, enclosing the flower, though divided at the top, is formed of a single piece.

48. The small leaves, *b*, embrace the Calyx, but form no part of it. These are called *scales*.

2. INVOLUCRE.

Fig. 9.



49. This Calyx is quite different from the perianth, since instead of embracing the flower, it is situated at a distance from it. It commonly consists of a number of small leaves, represented at *a*, Fig. 9, which surround the stems of such plants as Dill, Fennel, and Parsnip.

50. The Involucrum is said to be *partial*, when it surrounds the flower-stalks of only a part of the umbel, as at *b*; and *universal*, when it surrounds the stalk below where these join, as shown at *a*.

3. AMENTUM.

51. The *Ament*, or *Catkin*, Fig. 10, is another form under which the Calyx is found. It con-

46. What flower presents an example of this calyx?—47. Is this example composed of one or many pieces?—48. What are the small leaves below the calyx?—49. What kind of calyx is the involucre?—50. When is the involucre partial, and when universal?—51. What kind of calyx is the ament?

sists of many chaffy scales, attached to a thread, which connects the whole together.

Fig. 10.



52. These little scales are the Calyxes of the minute flowers, or florets, which they cover and protect. Each scale, with the parts under its protection, may therefore be considered a distinct flower.

53. In some Catkins there are both stamens and pistils, but more commonly the stamens are in one, and the pistils in another. The flowers of the Willow, Chestnut, and Walnut, are examples of this kind of Calyx.

4. SPATHE.

Fig. 11.



54. The *Spathe*, or *Sheath*, Fig. 11, protects the flower before it expands. This opens lengthwise at the time of flowering, as represented by the cut, and the flower-stalk continuing to grow, leaves this part beneath, forming the kind of Calyx in question.

55. The Daffodil, Onion, and Polyanthus, are examples.

52. Does the ament form one or many calyxes?—53. Are the stamens and the pistils in the same or different aments?—54. What is meant by the spathe or sheath?—55. What plants are examples?

5. GLUME.

Fig. 12.



56. The *Glume*, or *Husk*, Fig. 12, is the Calyx of the grains and grasses. In some species it is composed of a single piece only; in others, of two pieces as here represented; and in other species, of four pieces.

57. In the language of Botany, these pieces are called *valves*; thus the glume of the oat is *two-valved*.

58. To the glume is attached the beard, or *awn*, a bristle-shaped appendage, well known as forming a part of the heads of Wheat, Rye, and the Grasses.

6. VOLVA.

Fig. 13.



59. The *Volva*, or *Wrapper*, Fig. 13, is a membranous covering of some of the Mushroom, or Toadstool tribe, when young.

60. This membrane, as the plant increases in size, finally bursts, and afterwards contracts and dries, forming a kind of ring around the

56. What is a glume?—57. What are the pieces composing a glume called?—58. What is attached to the glume?—59. What is the volva?—60. What becomes of the volva after it bursts by the increase of the plant?

stems of the Mushrooms as represented in the figure.

7. CALYPTRA.

Fig. 14.



61. The *Calyptra*, *Cap*, or *Hood*, Fig. 14, is a kind of Calyx peculiar to the mosses. It is the cap or veil which covers the fruit of several species of that tribe. Its shape, as seen by the figure, resembles that of an extinguisher or thimble.

62. Examples of this kind of Calyx are very common among the mosses, which grow an inch or two high on barren rocks, and in moist, shady places.

63. We have thus described the Calyxes in most of their forms. They are seven in number, namely, the *Perianth*, *Involucre*, *Ament*, *Spathe*, *Glume*, *Volva*, and *Calyptra*.

These parts, particularly the *Perianth*, *Ament*, and *Spathe*, are exceedingly various in their forms and situations, so that the pupil will often be at a loss concerning them.

64. In many flowers the perianth is *deciduous*; that is, falls off with the flower, as in the Peach.

65. In others, it is *caducous*, or falls off when the flower expands, as in the Poppy.

61. What is a calyptra?—62. What are the plants to which the calyptra is peculiar?—63. How many kinds of calyx have been described, and what are their names?—64. What is meant by deciduous?—65. What is meant by a caducous calyx?

66. In the greater number of plants, however, this part is *permanent*; that is, it remains after the flower has disappeared, and when the fruit is perfected, as in the Pea.

67. At the base of the Pea-pod, for instance, the Perianth is as perfect as it was in the blossom. But in the Poppy the Perianth is seldom seen except before the flowering, since it falls off as soon as the blossom opens, and is therefore *caducous*.

COROLLA.

68. The *Corolla*, as already noticed, is the most delicate and conspicuous part of the flower, and that on which its beauty chiefly depends. Its situation is between the calyx and the stamens and pistils.

This part, like the calyx, is exceedingly various in its form and situation, as well as in respect to the number of petals of which it is composed. These varieties therefore require further illustration.

69. When the Corolla consists of only one piece, or petal, it is called *monopetalous*, or one-petalled.

66. When is the calyx said to be permanent?—67. What is an example of a caducous calyx?—68. On what does the beauty of a flower chiefly depend?—69. What is the term for a corolla of one petal?

70. If it consists of more than one piece, it is termed *polypetalous*, or many-petalled.

71. In many flowers, the one-petalled Corolla appears to be many-petalled, because the divisions reach nearly to the base of the Corolla; and this part being covered by the calyx, these divisions are taken for distinct petals. But, however deeply this part is divided, if the petals adhere to each other at the base, forming a ring or tube, it is monopetalous.

To ascertain the difference between these two kinds of Corollas, it is often necessary to dissect the flower, and to examine carefully its lower part, in order to determine whether the petals are joined together, or whether they are separate and distinct.

MONOPETALOUS COROLLAS.

Fig. 15.



72. The Monopetalous Corolla consists of two parts, namely, the *tube*, or cylindrical portion, which is often enclosed in the calyx, and the *limb*, which is the spreading portion of the same Corolla. Fig 15, *a* the limb, *b* the tube.

73. The Primrose is an example.

70. When it consists of many petals, what is it called?—
 71. Why does a one-petalled corolla sometimes appear to be many-petalled?—72. What is the limb and what the tube of a one-petalled corolla?—73. What is an example of this kind of corolla?

The following are among the most common forms of the Monopetalous Corollas.

1. CAMPANULATE.

Fig. 16.



74. The *Campanulate*, or *Bell-shaped* Corolla, Fig. 16, has the form of a bell, swelling suddenly at the base, and having no perceptible tube or elongation at that part.

75. The Bell-flower is an example.

2. INFUNDIBULIFORM.

Fig. 17.



76. The *Infundibuliform*, or *Funnel-shaped* Corolla, Fig. 17, has the form of a funnel. The base is small like a tube, gradually swelling upwards similar to an inverted cone.

77. There are many different varieties of this form, of which the Tobacco, Morning Glory, and Henbane, are examples.

74. What is the form of a campanulate corolla?—75. What is an example?—76. How is the infundibuliform corolla shaped?—77. What are examples?

3. ROTATE.

Fig. 18.



78. The *Rotate* or *Wheel-form* Corolla, Fig. 18, is shaped like a wheel, the limb spreading, with a very short, or no perceptible tube. When the student comes to study the 5th Class, he will find many examples of this kind of Corolla, among which are Red-pepper and Loose-strife.

4. RINGENT.

Fig. 19.



79. The *Ringent* or *Labiate* Corolla, Fig. 19, consists of a single petal, divided obliquely into two irregular parts, somewhat resembling the mouth of an animal. These two parts, marked *a* and *b*, are called the upper and lower lips.

80. When the lips are widely separated it is termed *ringent*, that is, gaping. When there is an appendage between the lips like a palate, so as to hide the interior, it is called *personate*, from *persona*, a mask.

81. Sage, Lavender, and Catmint, have labiate Corollas.

78. How is the rotate corolla shaped?—79. What does a labiate corolla consist of?—80. When is this corolla said to be ringent and when personate?—81. What are examples of labiate corollas?

5. HYPOCRATERIFORM.

Fig. 20.



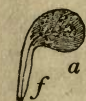
82. This means *Salver-shaped*. It has a tube, terminating in a spreading limb, or border, which is supposed to resemble a plate or salver, Fig. 20.

83. The Primrose and narrow-leaved Laurel are examples.

POLYPETALOUS COROLLAS.

84. *Polypetalous* means many-petalled, and any flower having more than one petal, comes within this class.

Fig. 21.



85. The petals of the Polypetalous Corollas usually consist of the elongated narrow part *f*, Fig. 21, called the *claw*, and by which it is attached to the calyx, and the expanded portion, *a*, which is called the *border*. The petals of the Rose and Butter-cup are examples.

82. What is the form of a hypocrateriform corolla?—83. What plants are examples of this corolla?—84. When are flowers said to be polypetalous?—85. What are the different parts of these petals called?

PAPILIONACEOUS.

Fig. 22.



86. The *Papilionaceous* or *Butterfly-shaped* Corolla, Fig. 22, consists of four distinct petals, each of which has a different name.

87. The upper, and largest petal is called the *banner*; the two side ones below this are the *wings*, and the lowest, which is between the last, and turned up like a boat, is the

keel. This latter part contains the stamens and pistils, which are thus enclosed and defended from injury.

88. The Pea, Bean, and Senna are examples.

CRUCIFORM.

Fig. 23.



89. The *Cruciform*, or *Cross-shaped* Corolla, Fig. 23, consists of four petals, the borders of which stand cross-wise with respect to each other. Plants with this Corolla are called *Cruciform* plants, or are said to belong to the

86. How many petals has the butterfly-shaped flower?—87. What are the names and situations of these petals?—88. What are examples of this kind of corolla?—89. What is a cruciform corolla? what plants present examples?

Cruciform tribe. Many of them are acrid and stimulating in their qualities, as Mustard, Horseradish, and Cress.

NECTARY.

90. The *Nectary*, or as the name implies, the *Honey-cup*, is that part of the flower which contains the honey. This name is also applied to certain appendages of flowers which contain no honey.

91. Nor does the honey in every instance, reside in a separate cell, or vessel, being sometimes found at the base of the petals. In general, therefore, every appendage belonging to a flower which is not included in the description of some other part, is called a Nectary, though sometimes very improperly.

Fig. 24.



92. In the Larkspur, the Nectary is formed by the prolongation of the corolla into a horn or spur, as represented at *a*, Fig. 24. In the Violet this part is formed in the same manner.

93. The Nasturtion has

90. What is the nectary?—91. Does the nectary always contain honey?—92. Which part of the flower of the larkspur is the nectary?—93. What is said of the nectaries of the nasturtion and ladies' slipper?

a Nectary which is made by a projection of the colored calyx. In the Ladies' slipper, the Nectary forms the most conspicuous part of the flower.

Fig. 25.



94. The Grass of Parnassus has a great number of nectaries consisting of little globular bodies, each attached to the end of a filament, Fig. 25, and interspersed among the stamens.

These are quite singular, there being, perhaps, no instance of any similar appendage.

Fig. 26.



95. In the Butter-cup, or Crow-foot, the Nectary is a small pit, or pore, *o*, in the claw of the petal, Fig. 25.

SITUATION OF THE STAMENS AND PISTILS.

96. The Stamens and Pistils occur under a great variety of situations with respect to each other. Their numbers are also exceedingly various, the Stamens being from one, to a hundred or more in different plants, the Pistils being somewhat less numerous. On the number and

94. What are the nectaries in the grass of Parnassus?—
In the butter-cup where is the nectary?—96. What is said of the situation and numbers of the stamens and pistils?

situation of these parts, depend the scientific arrangement of the Linnean System of Botany, as will be seen hereafter.

In general, as we have seen, the Stamens each consist of three parts, namely, the *filament*, the *anther*, which sits on its top, and the *pollen*, or dust, which the anther emits when it becomes mature and bursts.

Fig. 27.



97. But in many instances, the filaments are wanting, the anthers being situated immediately on the corolla. This case is shown by Fig. 27, which represents a corolla laid open, the situation of the anthers being marked by the small black dots above the letter c.

The Pistillum, like the Stamen, also consists of three parts, the *germen*, *style*, and *stigma*, as already explained.

98. The stigma being the essential part, the style is sometimes absent.

Fig. 28.



99. This is the case in the Poppy, where the large globular part, Fig. 28, is the germen on which sits the stigma, g, scollop'd, or radiated in a very curious and beautiful manner.

97. When the filament is wanting, where is the anther placed?—98. When the style is wanting, where is the stigma situated?—99. What example is offered?

USE OF THE STAMENS AND PISTILS.

100. The anthers of the Stamens at a certain period peculiar to each plant, burst and shed a fine dust, called the *pollen*. This in the Lily and most other plants is yellow, and is often seen covering the corolla. The pollen appears to be the reproducing agent in all vegetables, since it has been found, that it is through its influence on the stigma, that the seeds of plants are perfected.

101. If the anthers are destroyed before they distribute their pollen, or the stigma be mutilated or covered, so that this dust does not reach it, the seeds never become so perfect as to grow.

INFLORESCENCE.

102. *Inflorescence* signifies the mode of flowering, and it is obvious to every one, that there is a great difference among plants in this respect. Some flowers are single, others grow in clusters, others in heads, &c.

The modes in which plants put forth their flowers are distinguished by different names, which have been derived from something pertaining to the appearance, situation, or number, of their flowers.

100. Under what circumstances are the seeds of plants perfected?—101. If the anthers are destroyed what is the consequence?—102. What does the term inflorescence signify?

1. UMBEL.

Fig. 29.



reaching nearly to the same height, Fig. 29.

104. These plants are termed *Umbelliferous*, that is, umbel-bearing, and form a very extensive and important tribe of vegetables.

105. Dill, Carrot and Fennel are examples.

2. VERTICILLATE.

Fig. 30.



106. The *Verticillate* or *Whorled* Inflorescence, is formed when the flowers, on very short foot-stalks, compose a ring at intervals around the stem, Fig. 30. In some species the flowers do not, however, form an entire circle around the stem, but only grow on opposite sides.

107. Many of the labiate flowers are Verticillate, as Mint, Motherwort, and Hyssop.

103. What kind of inflorescence is the umbel?—104. Give examples of umbelliferous plants.—105. What term is applied to plants that flower in umbels?—106. When is the flowering said to be whorled?—107. What are examples of verticillate plants?

3. RACEMUS.

Fig. 31.



108. The *Racemus*, *Cluster*, or *Bunch*, consists of numerous scattered flowers, on its own proper stem, the whole proceeding from a common stalk, Fig. 31. A Cluster is sometimes *compound*, that is, consisting of several smaller clusters, each having its own stem, all of which proceed from a common stalk.

109. The Currant, Grape, and Poke weed are examples of the Raceme.

4. SPIKE.

Fig. 32.



110. The *Spike* is composed of many flowers arranged along a common stalk and sitting close to it. It generally stands erect, or nearly so, with the flowers crowded, Fig. 32. In some instances, however, the flowers form separate groups, leaving intervals of the stalk naked.

111. Wheat, Barley, and some of the Grasses, are examples of the Spike.

108. What is the form of a raceme?—109. What are examples of the raceme?—110. What composes a spike?—111. What are examples of the spike?

5. PANICLE.

Fig. 33.



112. The *Panicle* is formed of a loose, irregularly divided raceme, directed upwards, Fig. 33. It sometimes consists of several small spikes, fixed by separate footstalks to a common stem. When the stalks are distant from each other, it is called a *lax*, or *diffuse* Panicle, as in the London pride.

113. The Oat, and several of the Grasses are examples of the Panicle.

6. CORYMBUS.

Fig. 34.



114. The *Corymbus* is a sort of raceme, or irregular umbel, in which the lower foot stalks are long, and the upper ones short, so that the flowers at the top are nearly on a level. In general appearance it resembles the umbel, but in this, the foot stalks surround the stem at the same height, and are nearly of the same length.

115. Yarrow, and one species of the Golden rod, are examples.

112. What is the appearance of the panicle?—113. What are examples of a panicle?—114. What sort of inflorescence is the corymbus?—115. What are examples of the corymbus?

7. CAPITUM.

Fig. 35.



116. The *Capitum*, or *Head*, consists of many flowers crowded together, on a common receptacle and forming a globular shaped whole. This mode of Inflorescence can hardly be mistaken for any other, being distinct and well marked.

117. The Teasel, Clover, and Saffron are examples.

8. SPADIX.

Fig. 36.



118. A *Spadix* differs from a spike, in the flowers of the former being crowded or packed as closely together as possible, on a spongy, or porous stem, which stem is sometimes partly enveloped in a sheath, or spathe.

The dark colored, club-shaped part of Fig. 36, marked *a*, represents the Spadix of the Indian Turnip, partly enclosed in its sheath.

119. The Skunk Cabbage and Cat's Tail are other examples of the Spadix.

120. The different kinds of Inflorescence thus

116. What kind of inflorescence is the capitum?—117. What are examples?—118. How does the spadix differ from the spike?—119. What are examples of the spadix?—120. What are the different kinds of inflorescence enumerated?

illustrated, are the *Umbel*, *Verticillate*, *Racemus*, *Spike*, *Panicle*, *Corymbus*, *Capitum*, and *Spadix*.

The necessity of this kind of knowledge will be obvious when we come to describe plants, and especially when the student goes into the field with his manual in his hand, for the purpose of gaining a practical knowledge of Botany.

FRUIT OR SEED.

In ordinary language, we make a difference between the Fruit and Seed. The language of Botany also makes a difference, but in a more restricted sense.

121. Thus, when the Seed is enclosed in a pod or envelope, the whole is called the Fruit, as in the Apple, Peach, and Walnut. When the Seed is naked, then this alone is called the Fruit, as in the Hazle-nut and Sage.

122. Strictly speaking, however, no Seed ever occurs naked, since each one, though enclosed in a shell, pod, or husk, has its own particular membrane, or skin by which it is enveloped.

123. This may be observed, when a Pea or Bean is planted, and the two halves called the *cotyledons* swell and burst the membrane by which each is enclosed.

121. What difference does the language of Botany make between the fruit and seed?—122. Do seeds ever occur naked?—123. What are the two halves of a bean, or pea, called?

PERICARP.

124. The term *Pericarp*, comes from the Greek *peri*, about, and *karpōs*, fruit, or seed. It is therefore a general term, including any seed vessel, or external covering in which the seed is enclosed, whether it be in the form of a *pod*, *bag*, *shell*, *pulp*, or *berry*.

125. The most obvious use of the Pericarp is to protect and retain the seeds until they are ripe.

126. We may observe, also, that many seed vessels promote the dispersion of their seeds, by throwing them to some distance, when they are in a fit state to be planted, but it is believed never before.

127. The common garden flower called Touch-me-not, is a familiar example of such a provision.

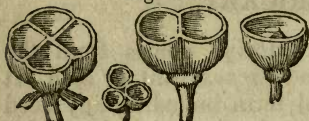
The Pericarp of this plant, which is composed of several valves, as it grows dry, acts as an elastic spring, and throws the seeds to some distance in all directions.

The Pericarps which are most common, are of the following kinds.

124. What is the derivation of the term pericarp? What does the pericarp include?—125. What is the most obvious use of the pericarp?—126. How do some pericarps promote the dispersion of their seeds?—127. What example is given of a pericarp which disperses its seeds?

1. CAPSULE.

Fig. 37.



128. The term *Capsule*, signifies a little chest, or casket.

129. In Botany, this term is applied to that kind of seed vessel which is hard, or of a woody texture, and which as it grows dry, divides into several parts, called *valves*, and discharges its seeds spontaneously.

The Capsule consists of one, or of many cells. Fig. 37, represents capsules of from one to four cells.

130. The first is called a *one-celled capsule*, the second, *two-celled*, and so on according to the number of cells contained within a common envelope.

131. The Pericarps of Flax, Mullein, Thorn-apple, and Walnut, are capsules.

132. Some capsules discharge their seeds by pores, without opening their valves, as the Poppy.

2. SILIQUA.

Fig. 38.



133. The *Siliqua*, or *Pod*, is a Pericarp of two valves, Fig. 38.

134. The meeting of the two valves, or the seam formed thereby, is called the *suture*. In some Pods the seeds are all attached to one suture, and in others they are arranged alternately along the edges of a

membranous partition, which divides the Pod into two portions, as seen in the figure.

135. The Pericarps of the Cabbage, Turnip, and Wall-flower, are examples.

3. SILICLE.

Fig. 39.



136. The *Silicle* or *Silicula*, is a little pod.

137. It differs from the proper *Silqua*, only in being shorter, and of a round, or oval shape. The seeds are alternately fixed to both sutures, Fig. 39.

138. The *Satin-flower* and *Shepherd's-purse* are examples.

4. LEGUMEN.

Fig. 40.



139. The *Legumen*, or *Legume*, Fig. 40, has two valves united by sutures, without a partition between them. The seeds are attached along one of the sutures or margins only.

140. This is also in common language called a pod, and is well known as the seed-vessel of Peas and Beans.

141. Hence these and others belonging to the same tribe are called *Leguminous* plants.

128. What does the term capsule signify?—129. What kind of a pericarp is the capsule?—130. When is a seed-vessel called a one, or two-celled capsule?—131. What examples are given of capsules?

5. FOLLICLE.

Fig. 41.



142. The *Follicle*, or *Bag*, is a seed-vessel composed of a single piece, or valve, Fig. 41. It is not divided into cells internally, but bears its seed either on a receptacle, which is placed parallel with the suture, or they are attached to the suture itself. This Pericarp bursts longitudinally on one side, and emits its seeds in the manner shown in the figure.

143. The Milkweed and Periwinkle are examples.

6. DRUPA.

Fig. 42.



144. The *Drupe*, is the pulpy seed-vessel of stone-fruit. The Pericarp is fleshy, and without valves, Fig. 42. This encloses the nut or stone, which is generally of an oval shape, and bony consistence, and contains the proper seed.

145. The Cherry, Plum, and Peach are Drupes.

132. How do capsules discharge their seeds?—133. What is a siliqua?—134. What is the seam formed by the two valves called?—135. What are examples of the siliqua?—136. What is a silicle?—137. How does the silicle differ from the siliqua?—138. What are examples of the silicle?—139. How are the seeds attached in the legumen?—140. What are examples of the legumen?—141. What is the tribe of plants bearing legumens, called?

7. BACCA.

Fig. 43.



146. *Bacca*, a Berry, Fig. 43.

The Berry is a succulent, or fleshy fruit, in which the seeds lose their adhesion when ripe, and become loose in the pulp.

147. The Berry becomes more juicy internally, as it advances to maturity, quite contrary to the nature of the capsule, though the difference between these fruits, when unripe, is

not in some cases readily distinguishable.

148. The Currant, Gooseberry, and Whortleberry are examples.

8. COMPOUND BERRY.

Fig. 44.



149. The *Compound Berry*, Fig. 44, consists of many small berries, each containing a seed, united into one mass.

The external surface is covered with little protuberances, each of which is called an *acinus*, or grain. These are considered as individual parts, though closely embraced by others.

150. The Raspberry and Blackberry are good examples of the Compound Berry.

142. What sort of a pericarp is the follicle?—143. What are examples of the follicle?—144. What is a drupe?—145. What are examples of a drupe?—146. What is a bacca?—147. How does the berry differ from the capsule?—148. What are examples of berries?—149. What is the compound berry?—150. What are examples?

9. STRAWBERRY.

Fig. 45.



151. The *Strawberry* is not properly a berry, according to the above definition, since the seeds are not contained in the pulp.

152. This delicious fruit consists of a soft, red, pulpy receptacle, which bears the seeds on the outside, in the form of small yellowish dots.

10. POMUM.

Fig. 46.



153. The *Pome*, or *Apple*, Fig. 46, is a fleshy Pericarp, without valves, and therefore in this respect resembling the berry and drupe. But it differs from both these in containing a capsule which encloses the seeds.

154. The number of seeds contained in this kind of Pericarp, as well as the shape and size of the fruit, are exceedingly various.

155. The Apple, Pear, and Quince, are common examples of the Pome.

151. Is the strawberry a proper berry or not?—152. How does it differ from a berry?—153. What kind of a pericarp is the pome?—154. What is the number of seeds in the pome?—155. What are examples of the pome?

11. STROBULUS.

Fig. 47.



156. The *Strobulus*, or *Cone*, Fig. 47, such as grow upon Pine trees, ought perhaps to be considered a hardened, or woody amentum, which remaining on the tree, finally becomes the capsule.

157. The seeds in this tribe of plants, after being perfected, are closely sheltered by the scales, which are placed over each other, like the shingles of a house.

158. The true Cones belong to the Pine, Cypress, and Fir tribes ; but the Alder and Birch often retain their aments, until they become so hard as to resemble cones.

DISSEMINATION OF SEEDS.

The Great Author of Nature has undoubtedly performed all his works in a manner far more perfect than the mind of a finite being can possibly comprehend. This may be inferred not only from the wisdom of the Maker, but also from the universal truth, that the more intimately we become acquainted with the minute parts, or hidden principles of nature, the greater cause do we find for admiration and wonder. Still, in no instance is it probable, that we are fully sen-

156. What is the strobulus ?—157. Where are the seeds sheltered in this tribe of plants ?—158. What are examples ?

sible of the mechanical perfection of any organic structure, much less are we acquainted with the causes by which their functions are performed. Thus we can observe in plants, the little tubes, by which the sap ascends to the branches, but our senses fail to inform us how perfectly they are adapted to this purpose, and least of all can we comprehend by what power or cause the sap circulates through these vessels.

On the contrary, the indications of nature with respect to the construction of many of the external parts of plants, are such as we can understand; because, either their forms or actions point out their uses. This is the case with respect to the contrivances with which many plants are furnished for the purpose of disseminating their seeds, and which are often highly interesting, as displaying the wisdom and design of Providence, in the inferior orders of creation.

In several species of plants the pericarps, as they become dry, open with a jerk, and thus throw the seeds they contain, several feet, or even yards, in all directions. We have already noticed this, as belonging to the common flower called Touch-me-not.

In some of the Ferns, an order of plants which bear the seeds on the backs of their leaves, or *fronds*, a similar provision may be observed. If a plant of this kind be examined, small spots will be seen on the backs of the leaves, either crowded together, or at a little distance apart. These contain the seeds, which are furnished with elastic springs, and which becoming dry, act

so as to project them to the distance of a foot or two. These seeds are exceedingly minute, but if the Fern be placed on a sheet of white paper, the effect will be seen by their distribution over its surface.

The little pods of the Furze, (*Ulex*), with the same design, are made to burst with a slight explosion, projecting the seeds to some distance when they are fully ripe. In dry, still weather, the snapping of these pods, by which their seeds are thus distributed, may be heard to some distance.

Many seeds are furnished with seed-down, constituting what we may consider their wings, and by which they are suspended, like little parachutes in the air. The Dandelion, Thistle, and Colts-foot, are among the most remarkable instances of this kind; and who, on seeing the air filled with the seeds of these species, thus taking their flight before the wind from one place to another, can, for an instant doubt, whether this downy apparatus was given them with the express design of their thus facilitating two of the great ends of nature, the distribution and perpetuity of these species.

The seeds of the Maple and Ash, are furnished with wings, not of down, but consisting of a fine membrane, and by means of which they are transported from one place to another, at the distance of miles.

Other seeds are provided with hooks, or barbs, by which they attach themselves to the

clothing of various animals, and are thus carried from one place or country, to another. Seeds have thus been carried from one kingdom to another in the wool of sheep.

Transportation by the currents of oceans, rivers, and seas, is another means by which the seeds of plants are distributed from one continent, or island, to another. Thus we find that certain fruits which are of the utmost importance to the inhabitants of tropical climates, are found on all the islands situated in certain latitudes, though at great distances from each other. In such cases there is no doubt but the seeds of these plants were transported from the continents, and from one island to the other, by the currents of the ocean. By the same means, it is known that the fruits of America and of the West Indies are cast upon the northern coasts of Scotland; the plants of Germany migrate to Sweden, and those of Southern Europe, to England.

All these circumstances tend to show, that what is commonly called *nature*, everywhere exhibits care and design, and that the lowest, equally with the highest orders of creation, are constantly under the superintendence of an Omnipresent agent.

THE LEAF.

We need not describe what is meant by the Leaves of plants, since of this no child can be ignorant.

159. Every tree and shrub is furnished with Leaves, of one kind or shape, or another.

160. There are, however, some plants which are entirely without Leaves, such as the Mushroom, or Toadstool tribes, and some of the Mosses.

161. Leaves are furnished with minute vessels, through which the sap circulates.

162. Leaves are generally oblong, and expanded in their forms, and thin and delicate in texture.

163. Some are, however, thread-like, as the Pines, while others are thick and juicy, as in the House-leek tribe.

SIMPLE LEAF.

164. Leaves are called *simple*, when only one grows on the same petiole, or foot-stalk, as the Pear, Oak, and Chestnut.

159. Are all plants furnished with leaves, or not?—160. What plants are without leaves?—161. Have leaves any vessels?—162. What are the general forms of leaves?—163. What exceptions to this form are mentioned?

The outlines, or forms, most common to simple leaves, are the following.

Fig. 48.



165. *Round*, Fig. 48, having the longitudinal and cross diameters nearly equal. It is very rare, if ever, that precise examples of this leaf occur in nature. *Pimpernel*, and *Round-leaved Winter-green*, are tolerable examples, though neither are exactly round.

Fig. 49.



166. *Ovate*, Fig. 49, egg-shaped, that is, having the form of an egg, divided lengthwise. The length is greater than the breadth, and the base broader than the apex. Examples: *Chequer-berry*, *Pear*. *Obovate* is this form reversed.

Fig. 50.



167. *Roundish*, Fig. 50. Nearly round, having little difference between the diameters across any part. Ex.: *Round-leaved Winter-green*, *Green-briar*.

Fig. 51.



168. *Oval*, Fig. 51, elliptical, having the length greater than the breadth, with the curvatures equal at both ends. Ex. *Lespedeza prostrata*.

164. When are leaves called simple?—165. What is the form of a round leaf?—166. What is that of an ovate leaf?—167. Of a roundish leaf?—168. Of an oval leaf?—169. Of an oblong leaf?

Fig. 52.



160. *Oblong*, Fig. 52, having the length several times more than the breadth, with the curvatures at both ends nearly equal
Ex. *Milk Weed*, *Solomon's Seal*.

Fig. 53.



170. *Lanceolate*, Fig. 53, spear or lancet-shaped. It is three or four times longer than it is wide, tapering towards both extremities, and ending in a sharp point.
Ex. *Narrow Plantain*, *Sweet William*.

Fig. 54.



171. *Linear*, Fig. 54, straight, the edges being parallel, except at the two extremities. Most of the *Grains* and *Grasses* have linear Leaves.

Fig. 55.



172. *Subulate*, Fig. 55, awl-shaped, gradually tapering from the base, or insertion of the petiole, and ending in a point.
Ex. *Common Sandwort*.

170. What is the form of a lanceolate leaf?—171. Of a linear leaf?—172. Of a subulate leaf?

Fig. 56.



173. *Reniform*, Fig. 56, kidney-shaped. It is a short, broad, roundish Leaf, with a sinus, or hollow, on each side of the petiole, or foot-stalk.

Ex. *Common Asarum, Gill-go-over-the-ground.*

Fig. 57.



174. *Cordiform*, Fig. 57, heart-shaped, having the length greater than the breadth, with an ovate form, and hollowed at the base. Ex. *Two-leaved Solomon's Seal, Morning Glory.*

Fig. 58.



175. *Lunate*, Fig. 58, crescent-shaped, or formed like a half moon.

It is nearly reniform, but the lobes are more or less pointed. Ex. *Two-leaved Birthwort.*

Fig. 59.



176. *Arrow-shaped*, Fig. 59, shaped like the head of an arrow. It is triangular, with the base divided and ending in points, the other, or upper angle, being extended and acute. Ex. *Arrow-head.*

Fig. 60.



177. *Lyrate*, Fig. 60, lyre-shaped, cut on the sides into several transverse lobes, or segments, of which those nearest the stem are the smallest. Ex. *Lyre-leaved Sage.*

173. What is the form of a reniform leaf?—174. Of a cordiform leaf?

Fig. 61.



178. *Panduriform*, Fig. 61, fiddle-shaped. It is long, broad at the two extremities, and narrow in the middle. Ex. *Virginia Bindweed*.

Fig. 62.



179. *Runcinate*, Fig. 62, lion-toothed, cut into many transverse, acute segments, pointing backwards. Ex. *Dandelion*.

Fig. 63.



180. *Hastate*, Fig. 63, halbert-shaped. The shape is triangular, the base spreading, and ending in two opposite angles; the form oblong, terminating in a point, with the sides a little hollowed. Ex. *Bittersweet*, *Canary Sage*.

Fig. 64.



181. *Sinuate*, Fig. 64, cut into rounded lobes, or wide openings, the margins bending in and out. Ex. *Water Horehound*, *Red Oak*.

175. What is the form of a lunate leaf?—176. Of an arrow-shaped?—177. Of a lyrate?—178. Of a panduriform?—179. Of a runcinate leaf?—180. Of a hastate leaf?—181. Of a sinuate leaf?

Fig. 65.



182. *Pinnatifid*, Fig. 65, wing-cleft. It is transversely divided into small lobes, or oblong segments, but not reaching to the midrib. Ex. *Wild Pepper-grass*.

Fig. 66.



183. *Lacinate*, Fig. 66, jagged, cut into numerous, irregular portions, or lobes, which are again sub-divided. Ex. *Crow Foot*, *Crane's Bill*.

Fig. 67.



184. *Palmate*, Fig. 67, hand-shaped, divided nearly to the insertion of the petiole into oblong lobes of similar sizes, but leaving a space entire, like the palm of the hand. Ex. *Passion Flower*, *Castor Oil Plant*.

Fig. 68.



185. *Lobed*, Fig. 68, divided into segments, the margins of which are rounded. In some leaves the divisions are much deeper than in others. Ex. *Liver Leaf*, *Sassafras*.

182. What is the form of a pinnatifid leaf?—183. Of a lacinate leaf?—184. Of a palmate leaf?—185. Of a lobed leaf? 186. Of a dentate leaf?

Fig. 69.



186. *Dentate*, Fig. 69, toothed, beset with projecting, horizontal, distant teeth, of the same substance as the

Leaf. Ex. *Blue Bottle*, *Enchanter's Nightshade*.

Examples of this form are not common, though sometimes to be found.

Fig. 70.



187. *Serrate*, Fig. 70, saw-like, the border being cut into notches, ending in sharp points, which incline towards the apex of the Leaf. Examples of this are very common, as *Nettle*, *Rose*, and *Peach*.

Fig. 71.



188. *Erose*, Fig. 71, gnawed, having the appearance of being bitten by insects, though not so in reality. Ex. *Fire Weed*.

With respect to the summits of Leaves, the following distinctions are the most common.

Fig. 72.



189. *Acuminate*, Fig. 72, pointed, with the termination extended, and in this respect differing from the lanceolate Leaf. Ex. *Indian Cucumber*, *Panic Grass*.

It differs from cuspidate in being more extended, and having a sharper point.

Fig. 73.



190. *Cuspidate*, Fig. 73, terminated suddenly by a bristly point. Ex. *Common Cassia*, *Rosy Tritonia*. *Mucronate* is nearly a synonymous term, and applies to the spiny terminations of the Leaves of *Thistles*, and some species of the *Aloe*.

Fig. 74.



191. *Emarginate*, Fig. 74, nicked, having a small notch in the end. Ex. *Bladder Senna*.

Fig. 75.



192. *Obtuse*, Fig. 75, blunt pointed, the termination being circular. Ex. *Primrose*, *Ground Laurel*. Examples not common.

Fig. 76.



193. *Cirrhose*, Fig. 76, tendrilled, the Leaf ending in a tendril, or clasper, by which the plant clings for its support. Ex. *Superb Gloriosa*.

This example is very rare.

187. What is the form of a serrate leaf?—188. Of an erose leaf?—189. Of an acuminate leaf?—190. Of a cuspidate leaf?—191. Of an emarginate leaf?—192. Of an obtuse leaf?—193. What is a cirrhose leaf?

With respect to the surfaces of Leaves, botanists make the following distinctions.

Fig. 77.



194. *Smooth*, Fig. 77. A leaf is said to be smooth when it is without hairs, wrinkles, or ribs. Ex. *Indian Cucumber*, *Water Plantain*.

Fig. 78.



195. *Nerved*, Fig. 78, ribbed, having longitudinal elevations and depressions, running from one end of the Leaf to the other. Ex. *Narrow Plantain*.

Fig. 79.



196. *Veined*, Fig. 79, having prominent veins, or divisions on the surface, which, as they extend from the base, grow smaller and multiply in number, running into each other. Ex. *Pear*, *Bass-wood*.

Fig. 80.



197. *Rugose*, Fig. 80, wrinkled, rough, as though the veins had contracted, causing the membrane to swell, and sink into little inequalities. Ex. *Sage*.

194. What is a smooth leaf?—195. A nerved leaf?—196. A veined leaf?—197. A rugose leaf?

Fig. 81. 198. *Plicate*, Fig. 81, plaited, the nerves alternately rising and sinking, forming the surface into ridges and channels, as though the Leaf had been laid in plaits or folds. Ex. *White Hellebore, Ladies' Mantle*.



COMPOUND LEAVES.

199. When several Leaves, or *Leaflets*, as they are termed, grow on a common foot-stalk, they form a compound Leaf.

200. Such Leaves do not fall off singly, but as the fall is occasioned by the separation of the common foot-stalk, all the leaflets forming the compound Leaf descend at the same time.

201. Ex. *Butternut, Tree of Paradise*.

Compound Leaves have received different names, depending on the number attached to a common foot-stalk, or on their relative situations.

Fig. 82.

202. *Binate*, Fig 82, two-leaved, when the common petiole bears two Leaves on its summit. This example is not common. Ex. *Dwarf Dogwood*.



198. What is a plicate leaf?—199. When are leaves said to be compound?—200. In the compound leaf, do the leaflets fall from the tree singly or as a whole?—201. Give an example of a compound leaf.—202. What is a binate leaf?

Fig. 83.



203. *Ternate*, Fig. 83, three-leaved, when the petiole terminates with three leaves. Ex. *Clover*, *Kidney bean*.

Fig. 84.



204. *Biterbate*, Fig. 84, twice three-leaved; when the common petiole divides into three parts, each bearing three leaflets. Ex. *Fumitory*, *Columbine*.

Fig. 85.



205. *Triterbate*, Fig. 85, three times three-leaved. The footstalk divided into three parts, and each of these parts are again subdivided into other three parts each of which bears three leaflets. Ex. *Low Anemone*, *Wind flower*.

Fig. 86.



206. *Pedate*, Fig. 86, foot-shaped, that is, like the foot of a bird. The Leaf is irregularly ternate, the lateral leaflets being sub-divided. Ex. *Birds-foot Violet*.

203. What is a ternate leaf?—204. A biterbate leaf?—
205. A triterbate leaf?—206. A pedate leaf?—207. A pinnate
leaf?—208. What are examples?

It is similar in form to the palmate Leaf, but is more deeply divided and not so regular.

207. When the petiole has a number of leaflets along its sides, it is called *pinnate*, or winged, from the Latin *pinna*, a pinion or wing.

208. Ex. *Rose, Ash, Senna.*

Fig. 87.



209. *Unequally pinnate*, Fig. 87, when a pinnate Leaf is terminated by an odd leaflet. This is quite common. Ex. *Rose, Ash, Walnut.*

Fig. 88.



210. *Abruptly pinnate*, Fig. 88, when the petiole of a winged Leaf ends abruptly, that, is without an odd leaflet or tendril. Examples are rare. *Senna.*

Fig. 89.



211. *Alternately pinnate*, Fig. 89, when the leaves alternate with each other, being placed on opposite sides of the foot-stalk. Examples not common. *Wood vetch.*

209. When is a leaf said to be unequally pinnate?—210. When abruptly pinnate?—211. When alternately pinnate?—212. When interruptedly pinnate?—213. When bipinnate? /

Fig. 90.



212. *Interruptedly pinnate*, Fig. 90, when the pinnate leaflets are alternately large and small. Ex. *Silver weed*, *Meadow sweet*.

Fig. 91.



213. *Bipinnate*, Fig. 91, doubly winged, when a common petiole bears pinnate leaves on each of its sides. Ex. *Mountain Spig-nell*, *Mimosa arborea*.

Fig. 92.



214. *Tripinnate*, Fig. 92, triply winged, when the common petiole has bipinnate Leaves on each side. The figure shows a tripinnate Leaf ending with an odd leaflet. Ex. *Angelica tree*.

With respect to the situation, and insertion of Leaves, not compound, and the manner in which they are connected with the stem, the following distinctions may be made.

214. When is a leaf said to be tripinnate?—215. When radical?

In the descriptions of plants, these distinctions are very important, as the young botanist will see when he goes into the field.

Fig. 93.



215. *Radical*, Fig. 93, root-leaves, when the leaves proceed directly from the root, generally surrounding the stem but never growing to it. Ex. *Dandelion*, *Side-saddle flower*.

Fig. 94.



216. *Alternate*, Fig. 94. Leaves are alternate when they grow along the stem, one after another. Not opposite. Ex. *Golden Rod*, *Large Pinweed*.

Fig. 95.



217. *Opposite*, Fig. 95, not alternate, but growing one against the other on the stem. Ex. *Monkey flower*, *Sage*.

216. When are leaves alternate?—217. When opposite?—
 218. When stellate?—219. When peltate?—220. When perfoliate?—
 221. When amplexicaul?—222. When vaginant?—
 223. What is a connate leaf?

Fig. 96.



218. *Stellate*, Fig. 96, star-like, or whorled, when the leaves grow in a circle around the stem. Ex. *Trumpet weed*, *Bedstraw*, *Turk's Cap Lily*.

This example is not uncommon, and gives the plant a regular and beautiful appearance.

Fig. 97.



219. *Peltate*, Fig. 97, target-shaped; where the petiole is inserted into the centre of the Leaf on the under side, like the arm of a man holding a shield. Ex. *Nasturtion*, *Peltate Geranium*.

Fig. 98.



220. *Perfoliate*, Fig. 98, Leaf pierced: when the stem passes through the Leaf, or the Leaf surrounds the stem without an opening. Ex. *Bellwort*, *Thoroughwort*.

Fig. 99.



221. *Amplexicaul*, Fig. 99, stem clasping; when the Leaf embraces the stem, except on the side opposite the apex. Ex. Several species of *Solomon's seal*; also, several of the *Asters*.

Fig. 100.



222. *Vaginant*, Fig. 100, sheathed, when the base of the Leaf forms a tube which surrounds the stem. Ex. Most *Grains* and *Grasses*.

Fig. 101.



223. *Connate*, Fig. 101, growing together so as to appear perfoliate. Two amplexicaul Leaves growing opposite, form a connate Leaf. Ex. *Monkey flower*.

Remarks. The student will find it difficult to obtain Leaves of all the precise forms above figured and described; though in general he will find little difficulty in referring his specimen to one or another of the figures, or to two or three combined. Thus an ovate Leaf may at the same time be pointed, so as to make it *ovate-lanceolate*. A heart-shaped Leaf may be oblong, forming an *oblong cordate* Leaf, &c.

It would be impossible to have given the exact form of each Leaf, without delineating those of every individual species, a work too extensive for our present object. Our design, therefore, has been to give the most common forms, or those to which the greatest number of Leaves could be referred.

224. What is the petiole?—225. When is a petiole said to be simple?

THE PETIOLE.

224. The Petiole, as already stated, is the foot-stalk of the Leaf. It is that part which connects the Leaf with the tree, or when the Leaves are *radical*, with the root. It is commonly a little channelled on the upper side.

225. The Petiole is said to be *simple*, when it bears only a single Leaf.

Fig. 102.



226. The *Sweet-scented Geranium*, Fig. 102, also the *Apple*, *Plum*, and *Peach*, are examples.

227. The Petiole is *compound* when it bears several leaflets.

228. The *Rose*, *Ash*, and other compound Leaves already described, are examples.

Fig. 103.



229. *Winged Petiole*, Fig. 103. The Petiole is said to be winged, when it is expanded into a border on each side, in the form of wings. Ex. *Orange Tree*.

Good specimens of the winged Petiole are not common.

226. Give an example.—227. When is it compound?—228. Give examples.—229. What is a winged petiole?

FROND.

Fig. 104.



230. *Frons*, or Frond, Fig. 104. This is the stem and Leaf in one, or in other words, the seed or fruit are produced on the Leaf itself. This tribe is called *flowerless* plants, because they bear no flowers, properly so called.

231. *Common Polypody* is an example. The figure shows the Frond of a *Fern*, with the fruit on its back.

STIPE.

Fig. 105.



232. *Stipe*, Fig. 105. The Stipe is the stalk, or trunk of the Mushroom tribe, being that part on which the cap, or head stands. This term is also applied to the little pillar which supports the down in compound flowers, or connects the wing with the seed, as in the *Dandelion* and *Salsify*.

230. What is a frond?—231. Give an example of a frond.
—232. What is a stipe?

THE STEM.

233. The words *Stem*, *Stalk*, and *Trunk*, are sometimes each applied to signify the same part of the plant, though more commonly the latter term is applied to trees only, and the other to the corresponding part of smaller plants.

This part is so various in different vegetables as to require several divisions.

TRUNK.

234. The *Trunk*, or *Stem*, properly so called, is the ascending part of trees and shrubs. This may be *woody*, *succulent*, *fleshy*, or *medullary*, that is, containing a pith, or it may be *hollow*, *empty*, *simple*, *branched*, &c.

235. *Woody Stem*. Trees and shrubs generally have solid Stems of wood.

236. These of course are of sizes in proportion to the magnitude of the tree. In this respect, therefore, there is a vast difference, for while the *American Pines* are 200 feet high, the *Willow Tree* of Spitsbergen rises only three or four inches from the ground.

237. *Pithy Stem*. The pith is the well known soft, elastic, light substance, contained in the centre of many woody plants.

233. What is the difference between the stem, or stalk, and the trunk?—234. What is the trunk, or stem, properly so called?—235. What plants have woody stems?—236. What is said of the different sizes of woody stems?—237. What is a pithy stem?

238. The *Common Elder* is a good example. Many plants when young contain pith, which is replaced by wood as they grow old. The young shoots of elder always contain the largest pith, though their stems are only half the size of the parent. Hence we may either infer that the pith is converted into wood, or that the wood increases around it, and presses it into less compass.

239. *Tubular Stem.* Hollow, or tubular Stems are common. *Fennel, Dill, Parsley, and Trumpet Weed,* are examples.

240. *Simple Stem.* This Stem is entire, or unbranched, as that of the *Lily* and *Bamboo*.

Fig. 106.



241. *Ramose, or Branched Stem,* Fig. 106. This merely indicates that the Stem is divided into limbs or branches.

242. Of this there are several kinds, as *Brachiate*, arm-like, having opposite branches, like arms, which alternately cross each other, as in the figure.

243. *Dichotomous*, forked, when the divisions are only in two parts. *Much branched*, as in the *Apple* and *Pear*.

238. What is an example of a pithy stem?—239. What stems are tubular?—240. What is a simple stem?—241. What is a ramose stem?—242. What is a brachiate stem?—243. What is a dichotomous stem?

Fig. 107.



244. *Naked Stem*. This is a Stem without Leaves, or thorns, Fig. 107. Ex. *Jointed Saltwort*, a plant which is common on our sea shores. Stem a foot high, jointed, fleshy, and of a green color. There are several species of this plant, which being burned, and the ashes lixiviated with water, and the water evaporated, there remains the *soda* of commerce. This plant is also used for pickles.

Fig. 108.



245. *Spiral, or Twining Stem*, Fig. 108. The *Hop*, *Grape*, and *Bean*, are examples of this kind of Stem.

246. Some plants turn to the right, and others to the left, but in this respect each species is governed by invariable laws. Every *Hop Vine*, for instance, turns round its pole from left to right, while every *Kidney Bean*, as invariably turns from right to left.

CULM.

247. The *Culm*, or *Straw*, is the stem of the *Grasses*, *Rushes*, and *Canes*, and other plants of these tribes. This part is of several kinds.

244. What is a naked stem?—245. What is a spiral stem?
—246. What is said of the direction in which stems turn?

Fig. 109.



248. *Jointed Culm*, Fig. 109. This is divided into spaces by knots, or joints, as in the straw of the *Oat*, *Wheat*, and *Rye*.

249. The *Bamboo*, of the East Indies, is the tallest and largest of all Culms; being sometimes forty feet in height, and three inches in diameter.

250. *Geniculated Culm*. Geniculated means bent like the knee. This is peculiar to some species of *Grass*. Ex. *Floating Fox-tail*.

251. *Simple Culm*. This Culm is without joints or knots. It is straight and smooth. Ex. *Cats-tail*, *Common Rush*.

SCAPE.

Fig. 110.



252. The *Scape*, Fig. 110, is the flower-stem. It springs from the root, elevates the flower, and bears the fruit, but not the leaves. Plants with radical leaves, are furnished with Scares.

253. *Dandelion*, *Daffodil*, and *Colts-foot*, are examples.

254. These are called *Stemless* plants, as the proper Stem always elevates the leaves.

PEDUNCLE.

255. The *Peduncle*, or flower-stalk, springs from the Stem or branch, and bears the flower and fruit, but not the leaves.

256. The *Pedicel*, or little flower-stalk, is the ultimate subdivision of the Peduncle.

257. The *Common Elder*, is an example. The *Peduncle* is the stalk which bears the cluster of berries, while each berry has its own pedicel. A bunch of *Grapes* is another example.

THE ROOT.

Having thus described the *Flower*, the *Flower-Stalk*, the *Branches*, the *Leaves*, and the *Stem*, we come now to the *Root*.

258. Roots, like plants, are, with respect to duration, either *annual*, *biennial*, or *perennial*.

249. What is the largest culm known?—250. What is a geniculated culm?—251. What is a simple culm?—252. What is a scape?—253. What plants are examples?—254. What are these called?—255. What does the peduncle bear?—256. What is the pedicel?—257. Give examples of the pedicel.—258. How are roots distinguished, with respect to duration?

259. *Annual* Roots produce their flowers and seeds in the course of a single season or year, after which they decay and turn to dust.

260. *Potato*, and *Cucumber*, are examples.

261. *Biennial* Roots produce their herbage the first year, and their flowers and seeds the second year, after which they decay.

262. *Carrot*, *Parsnip*, and *Cabbage* are examples.

263. *Perennial* Roots, produce herbage, flowers and seeds every year, for an indefinite period of time.

264. The *Oak*, *Chestnut*, and *Pear*, are examples.

265. Some trees continue to live, grow and bear fruit for hundreds of years; such are the *Cedar*, *Olive*, and *Oak*.

266. Roots are distinguished into several kinds, depending on their shapes.

Fig. 111.



267. *Fusiform Root*, Fig. 111, spindle-shaped, being thick above, or near the surface of the earth, but gradually diminishing in size as it descends into the earth. This Root is commonly simple, or undivided.

268. *Parsnip*, *Carrot*, and *Radish*, are examples.

259. In what time do annual roots produce their seed?—
 260. What are examples?—261. How long do biennial roots continue?—262. Give examples.

Fig. 112.



269. *Premorse Root*, Fig. 112, abrupt. Premorse means *bitten*. This Root terminates as though it had been bitten off under the ground. *Primrose*, and *Pedate Violet* are examples.

These Roots do not, however, always have this appearance, it being only after the first year, that they become premorse, before which they are more or less fusiform.

Fig. 113.



270. *Branched Root*, Fig. 113. Divided into numerous ramifications or branches, like the limbs of a tree. This is the most common of all the forms, under which Roots are found.

271. All trees and shrubs, and most annual and biennial plants have branched Roots.

Fig. 114.



272. *Fibrous Root*, Fig. 114. It consists of many small fibres, sometimes so near each other as to form tufts. In poor soils the fibres are so fine as to resemble down.

273. Most of the *Grasses* have fibrous Roots.

Fig. 115.



274. *Tuberous Root*, Fig. 115. This consists of a number of individual Roots, or tubers connected together by fibres, or strings, running from one to the other.

275. Some tuberous Roots are perennial, as the *Artichoke*. Others are annual, as the *Potato*.

Fig. 116.



276. *Granulated Root*, Fig. 116. This is a variety of the tuberous Root. It consists of small tubers or knots, growing in clusters, and connected by threads. *Wood Sorrel*, and many of the *Grasses*, are examples.

Fig. 117.



277. *Palmated Root*, Fig. 117, hand-shaped, consisting of oblong tubes, connected where the Root and stalk join, but separate below, somewhat resembling the hand.

278. *Dahlia*, and *Orchis*, are examples.

263. What is said of the duration of perennial roots?—

264. What trees are examples?—265. What trees continue to

bear fruit for hundreds of years?—266. By what are the different

kinds of roots distinguished?—267. What is the form

of a fusiform root?—268. What are examples?—269. What

is a premorse root?—270. What is a branched root?

BULBOUS ROOTS.

Fig. 118.



279. *Solid Bulb*, Fig. 118. This consists of a uniform, fleshy substance, generally of a globular form. It differs from the tuberous root, in there being only a single one attached to a plant.

280. *Turnip*, *Crocus*, and *Dog's-tooth Violet*, are examples.

Fig. 119.



281. *Tunicated Bulb*, Fig. 119, coated bulb. It consists of many coats, or layers, surrounding each other, and which may be separated in succession.

282. The *Onion* is an example.

Fig. 120.



283. *Scaly Bulb*, Fig. 120. It consists of many scales, connected at the base, and lying one over the other. These are separate pieces, and not continuous coats, as in the tunicated Root.

284. *White Lily* is an example. Sometimes many small bulbs are enclosed in a common tunic, as in *Garlic*.

271. What are examples?—272. What is a fibrous root?—
273. Give examples.—274. What is a tuberous root?—275.
What are examples?—276. What is a granulated root, and
what are examples?—277. What is a palmated root?

Fig. 121.



285. *Repent Root*, Fig. 121, creeping Root. This Root

creeps along, either on the surface of the ground, or just under it, throwing out fibres which pierce the earth at intervals, and now and then shooting up its fruit-stalk and leaves.

286. *Strawberry*, and *Mint*, are examples.

All the above described Roots are attached to the earth, and most of them are fixed under its surface.

287. There are, however, some plants whose Roots are not fixed to any solid substance, but float in the water.

Fig. 122.



288. *Floating Root*, Fig. 122. The figure represents the plant called *Duck meat*, and of nearly its natural size. The plant consists of little flat, green, oval scales, floating on the

surface of the water of ditches and stagnant ponds. From the under sides of these, proceed the Roots, hanging like threads of several inches in length, and thus is the whole plant constituted.

278.—Give examples.—279. What is a solid bulb?—280. Give examples.—281. What is a tunicated bulb?—282. What is an example?—283. What is a scaly bulb?—284. What is an example?—285. What is a repent root?—286. What are examples?

Floating Liverwort is another plant of similar habits. Its frond or leaf is nearly of an inch in diameter, and from its under surface proceeds a little tuft of Roots, the whole swimming on the water of ponds.

APPENDAGES OF PLANTS.

Besides the essential part of a perfect plant, which we have described, many species are furnished with *arms* or Appendages, which are entirely wanting in others.

289. These Appendages, or those commonly enumerated, are the following. *Stipule*, *Bract*, *Thorn*, *Prickle*, *Tendril*, *Gland*, and *Hair*.

Fig. 123.



290. *Stipules*, or *stipula*, Fig. 123, are leafy Appendages to the proper leaves, or their foot-stalks. They are commonly smaller than the principal leaves, and are situated at their bases in pairs. In some plants these stipules soon fall off, but in others they are permanent.

287. Are there any roots which are not fixed to the earth?
 288. What plants have floating roots?—289. What are the names of the arms or appendages of plants.

291. Examples are seen in the *Pea*, *Rose*, *Wild Cherry*, and *Garden Violet*.

Fig. 124.



292. The stipules of the Grasses are situated within the bases of their leaves, and are generally of the shape represented by Fig. 124 *d*. In a great proportion of plants, this part is entirely wanting.

Fig. 125.



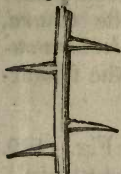
293. *Bracts*, or Floral leaves, Fig. 125, are leafy Appendages to the flower or its foot-stalk, and are of a variety of forms and colors.

294. They are not, like the stipules, situated at the bases of the leaves, but on the peduncle of the flowers. They are smaller than the true leaves, and at a little distance from them.

295. In the *Lime tree*, or *Basswood*, this part remains on the tree during the whole year. In the *Painted Cup*, the bracts form the most beautiful part of the flower.

290 What are stipules?—291. What plants bear this appendage?—292. Where are the stipules of the grasses situated?—293. What are bracts?—294. Where are the bracts situated?—295. What are examples?—296. Do thorns arise from the wood or bark?—297. What is said of plants losing their thorns by cultivation?—298. What is an aculeus?—299. What plants are armed with prickles?

Fig. 126.

296. *Thorn, or Spine*, Fig. 126.

This is a well known Appendage, with which a number of species are armed. It originates in the wood of the plant, with which it forms a part. It is sometimes found on large trees, as the *Honey Locust*, but is more common on shrubs, as the *Thorn Bush*.

297. Uncultivated *Pear* and *Apple* trees are often armed in this manner, but on being cultivated the thorns disappear. Hence Linnæus denominates such plants as *tamed*, or deprived of their natural ferocity, by culture.

Fig. 127.

298. *Aculeus, or Prickle*, Fig. 127.

This Appendage does not arise from the wood, like the thorn, but only from the bark, and never disappears by cultivation.

299. The *Rose*, and common *Briar*, are examples, and if the bark of either be stripped off, the prickles will be found attached to it.

Fig. 128.

300. *Tendril, or Clasper*, Fig. 128.

This part is designed to sustain plants, with weak stems, by taking hold of those which are stronger.

301. Nearly all climbing vines are

furnished with tendrils. They proceed either from the side of the stem, as in the *Gourd*, from the end of the leaf, as in the *Gloriosa superba*, or sometimes from the end of the flower-stalk.

Fig. 129.



302. *Gland*, Fig. 129. This is a tumor, or tubercle, generally very small, which discharges an oily, or succulent fluid. It is situated on various parts of the plant, as on the back of the leaf, on the petiole, or sometimes between the notches of the

leaves. Some Glands are elevated by little foot-stalks, as at *g*, in the figure, where they are represented on the petiole.

303. The *Moss Rose* owes its name and peculiarity to little Glands on the calyx and flower-stalks.

PUBESCENCE.

304. This term includes the *clothing* of plants, whether it consists of *hair*, *wool*, *down*, *bristles* or *stings*. These slight Appendages differ much from each other, in form, softness, and color.

301. What plants are furnished with tendrils?—302. What is a vegetable gland?—303. What example is given?—304. What is meant by pubescence?—305. Whence do the clothing of plants derive their names?

305. Their individual names are taken from that of the substance or thing they most resemble.

306. Thus *Mullein* is *woolly*, *Colt's-foot* is *downy*, and *Nettle* is *prickly*, &c.

BUDS.

307. *Buds* are oval protuberances projecting from the limbs of trees, and containing the unfolded leaves and flowers.

308. Buds, also called *Gems*, are of three kinds, namely, *Leaf Buds*, *Flower Buds*, and *Mixed Buds*.

309. 1. *Leaf Buds*, are such as contain the rudiments of the leaves only.

310. 2. *Flower Buds*, such as contain the embryo of the flowers only.

311. 3. *Mixed Buds*, such as contain the rudiments of both leaves and flowers.

312. The Buds of trees are not formed in the spring just before they expand into leaves and flowers, but in the summer, or autumn before, being produced for the purpose of protecting the rudiments they contain from the cold of winter.

306. What are examples?—307. What are buds?—308. How many kinds of buds are there?—309. What are leaf buds?—310. What are flower buds?—311. What are mixed buds?—312. When are the buds of trees formed?

313. That the Buds of trees are formed for this purpose, is proved by the circumstance that in hot climates, and in green-houses where the temperature of summer is preserved through the winter, no buds exist.

314. Trees which are natives of cold climates, and which therefore need Buds, are always furnished with them; but if such trees are removed to warm climates, these parts are no longer produced.

315. Tree Buds consist of several scales placed one within the other, there being in many instances a downy, or woolly substance between them, evidently for the purpose of producing more warmth than the scales would do alone.

316. No such appendages are ever seen in annual or summer plants because they are not needed, the hand of nature being ever careful to furnish her productions with just what they require, but no more.

317. Hence the plants of the arctic region are universally furnished with Bud scales, or winter cases, while those of tropical climates are entirely without them.

313. What are the uses of buds?—314. How is the use of buds proved?—315. What do buds consist of?—316. Do annual or summer plants have buds?—317. What is said of arctic and tropical plants with respect to buds?—318. What are the forms of buds?

318. Buds have various forms, but are most commonly oval, or roundish with a sharp point, as in the *Rose*, *Peach*, and *Lilac*.

319. With respect to the manner in which the leaves are folded within the Bud scales, there is a great difference in different plants. Some are doubled, others are plaited, and others folded.

The following figures will show in what manner leaves are folded in their Buds.

Fig. 130.



a Doubled as in the *Oak*, and *Rose*, (*a*.)



b Double, and embracing each other as in *Valerian* and *Teasel*, (*b*.)



c Doubled in a compound manner as in *Carrot* and *Mimosa*, (*c*.)



d

Rolled inwards, as in the *Grasses*, (*d*.)



e

Tiled as in *Lilac* and *Privet*, (*e*.)

319. In what manner are buds folded within the scales?—
320. What difference is there between the leaf, and flower buds?—321. Is this difference such as to make one kind distinguishable from the other?

Fig. 131.



Reclining, as in *Wolf's-bane*, and
Anemone, (f.)



Rolled breadthwise, as in the
Ferns, (g.)



Plaited, as in the *Palm tree* and
Birch, (h.)



Rolled outwards, as in *Rosemary*
and *Primrose*, (i.)

In all cases, whether the leaf be rolled, folded, or plaited, it is so arranged as to take up the least possible space.

320. There is a difference in the form of the leaf and flower *Buds*, by which each may be known in the early spring, or in some instances, even in the autumn. The flower *Buds* are short and thick set, while those enclosing leaves are more pointed and slender.

321. Hence gardeners and others by inspecting these parts, and comparing them, are able to judge of the prospect of a fruitful season.

The flower *Gems*, like those of the leaves, are wrapped up in various forms, the petals, and calyx, being sometimes rolled into a spiral, sometimes plaited, or doubled, &c.

322. What is said of the horse-chestnut bud ?

322. The Gem of the *Horse-chestnut*, being peculiarly large, is one of the best specimens for examination. The three following figures represent the different periods of its growth. But the botanical student ought to examine this, as well as other Buds for himself.

Fig. 132.



Figure *a*, shows a Horse-chestnut Bud in its entire state, covered with its winter scales, and terminating a branch.

Fig. 133.



The same is shown at *b*, cut in two, lengthwise, and exhibiting its young leaves, just beginning to expand, but still covered by its winter case.

Fig. 134.



The same is shown at *c*, with the young leaves partly open, the Bud scales being removed.

323. Is the pith of the new shoot a continuation of the old or not?—324. Are buds individuals or parts of the parent tree?

323. The pith of the branch in the autumn was found to terminate completely at the base of the new Bud, as represented at *b*, and in the spring following, although the pith of the new shoot was found to be in contact with that of the old, yet it was evident that it was not a continuation of it, but a new production. The same fact may be observed with respect to the buds of the Cherry, Pear, Peach, and Lilac, and probably of all similar plants.

324. Hence, Buds, though situated on the parent stalk, and produced by the vital action of the plant of which they are the progeny, are still in themselves complete individuals.

325. This appears, not only from the circumstance just stated, but also by the well known fact, that if a Bud be cut from one tree and inserted into another, it will grow into a perfect branch, and bear fruit and flowers of the same kind, and in the same manner that it would, had it been untouched.

326. How far this may be practised with success by budding different tribes upon each other, we do not know. It is certain, however, that in some instances plants of quite different characters will grow on each other, as in the well known case of the Quince tree upon the Thorn Bush. The Pear also grows well upon the Quince, and the Potato has been made to

325. How is it shown that buds are complete individuals?
326. How far will different tribes of plants grow on each other?

grow upon the Love-apple, (Tomato,) and the Melon on the Gourd. The latter instances, however, are only interchanges among the same tribe, and there is no doubt where such affinities exist, but almost every plant will grow upon the others.

CLASSIFICATION OF PLANTS.

327. The illustrations we have given of the different parts of the plants, and the explanations of the terms by which they are designated, are merely the preparatory steps, by which the pupil will be enabled to understand a systematic arrangement of the vegetable kingdom, and ultimately to distinguish one species from another, with the assistance of books only.

328. The scientific arrangement with which we here propose to make the pupil acquainted, is that of Linnæus, who was born in Sweden in the year 1707.

329. Linnæus was the most industrious, and consequently the most learned of all naturalists. He travelled into all parts of Europe for the purpose of gathering and examining plants.

327. What are the objects of the illustrations and explanations already given?—328. What is the scientific arrangement which is to follow?—329. What account can you give of Linnæus?

He even explored inhospitable Lapland, with the same object, where he suffered every kind of fatigue, and privation, in search of new species.

330. And such was his devotion to the cause of science, that during his life he minutely and carefully examined more than eight thousand species of vegetables. He died in 1788, in his seventy-first year.

331. By the Linnæan system, the Vegetable Kingdom is divided into twenty-four CLASSES.

332. These are distinguished from each other, by the number, situation, or proportion of the *stamens*, so that this arrangement is founded entirely on the flowers of the plants.

333. It is necessary, therefore, in order to ascertain the place of any plant, and consequently its name, that its flower should in the first place be obtained.

334. The Classes are divided into ORDERS.

335. These are founded either on the number of *styles* or *pistils* the flowers contain,—on the situation of the *fruit*,—on the kind of *pericarp*, or on some other circumstance, which will be explained when we come to illustrate this part of the subject.

330. How many plants did he examine?—331. Into how many Classes does the Linnæan method divide plants?—332. How are the Classes distinguished?—333. What part of the plant is required in order to find its place?—334. What is the next division after the Classes?—335. On what are the Orders founded?

336. The Orders are next separated into *Genera*.

337. The names of these are arbitrary, that is, they are not founded on any botanical relation, or peculiarity of the plant. Some of the genera are named after celebrated botanists, or other men of high literary, or scientific standing. Thus *Jacksonia* was named after Mr. Jackson, an English botanist; *Linnæ* after Linnæus; *Bromelia*, after Mr. Bromel, &c.

338. The genera are next sub-divided into *Species*, the names of which are mostly derived from some circumstance, or peculiarity by which the plants can be distinguished from each other. Perhaps these distinctions are most frequently derived from some difference in the form of a leaf; but the length of the stalk, the place whence the species came, and a great variety of other circumstances have been the foundation of specific names.

339. The well known genus *Geranium* of which there are a great number of species, affords an excellent illustration of this subject.

340. As in several other genera, the species are often named after some plant, the leaf of which, the leaves of the *Geranium* most resemble. Thus we have the *Oak-leaved*, the *Crow-*

336. Into what are the Orders divided?—337. What is said concerning the names of the genera?—338. What are the divisions of the genera called, and whence do they derive their names?—339. What plant is said to afford a good illustration of this subject?—340. Whence do many of the geraniums derive their names?

foot leaved, and the *Aconite-leaved* Geranium; also the *Heart-leaved*, *Jagged-leaved*, &c.

341. This is a good mode of distinction because it is not only permanent, but often so striking as not to be mistaken. Thus any one who has seen an oak leaf can select the oak-leaved Geranium from all the other species, by a mere glance of the eye.

342. Many species of plants produce *varieties*; that is, some plants from the same seed, or root, will differ from others in consequence of accidental causes.

343. These differences may depend on the mode of culture, richness of the soil, temperature of the climate, and a great variety of other circumstances. Thus the *Apple* and *Pear*, though from the same seed, produce on different trees, sweet and sour, or large and small fruit.

344. These are *varieties* of the Apple and Pear, of which innumerable examples occur. But the species never change; the seed, form of the leaf, number of stamens and pistils, and the divisions of the calyx, and other characters on which a species is founded, always remaining the same.

345. It will be remembered that the whole vegetable kingdom is divided into twenty-four

341. Why is this a good method of distinction?—342. What are varieties in the vegetable kingdom?—343. On what do varieties depend?—344. Do the species of plants ever change?—345. What are the divisions of the whole vegetable kingdom?

CLASSES ; the Classes are divided into ORDERS, the Orders into *Genera*, the Genera into *Species*, and the Species into *Varieties*, where they exist.

346. The first eleven Classes are founded entirely on the number of stamens which the flowers contain, and are distinguished by names derived from the Greek, which names express the number of these parts belonging to each Class.

347. The first Class is named MONANDRIA, which signifies *one stamen*, being compounded of the Greek words *monos*, one, and *aner* a stamen.

348. The second Class in like manner, signifies two stamens, and is called DIANDRIA, being compounded of *dis*, twice, and *aner*, a stamen. The third Class signifies three stamens, and so on to the tenth.

349. This part of the Classification is therefore extremely simple, so that any child who has previously learned to distinguish the stamens, may immediately become a practical botanist ; since all that is required to refer a plant to its proper place in any of the Classes from the first to the tenth, is to count the stamens, and observe whether they are all separate, and of the same length. Thus if the flower has one stamen only, it belongs to the first Class, MONAN-

346. On what are the first eleven Classes founded ?—347. What is the name of the first Class, and whence is this name derived ?—348. What are the names of the second and third Classes, and how many stamens have each ?—349. What knowledge is required to refer plants to their places in the first ten Classes.

DRIA; if two, it belongs to DIANDRIA; if three, to TRIANDRIA; and so on with respect to the others.

The names of the other Classes will be explained in connection with their illustrations.

350. The *Orders* of the first thirteen Classes are founded on the number of *styles*, or on the number of *stigmas*, when the styles are wanting.

351. The names of these orders are therefore indicative of the number of pistils, or stigmas, which the flowers contain, as the names of the Classes are of the number of stamens.

352. The name of the first Order, in each of the first thirteen Classes, is *Monogynia*, which word is derived from the Greek *monos*, one, and *gyne*, a pistil.

353. The second Order is *Digynia*, and is derived from *dis*, twice, and *gyne*, a pistil. The name of this Order is the same in most of the thirteen Classes. The third is *Trigynia*, three pistils; the fourth *Tetragynia*, four pistils, &c.

354. In practice, nothing is more simple or easily learned and understood than the first half of this system. A mere child with a few days practice, may learn to arrange his flowers according to it, with the same accuracy as the most experienced botanist.

350. On what are the Orders founded?—351. What do the names of the Orders of the first thirteen Classes indicate?—352. What is the name of the first Order in the thirteen first Classes, and what is the origin of the fourth?—353. What are the names of the second and third Orders?—354. What is said of the simplicity of the first part of this science?

355. Thus, if a flower has only one stamen, and one pistil, it belongs to CLASS 1. MONANDRIA, and ORDER 1. MONOGYNIA.

356. If it has one stamen and two pistils, it belongs to MONANDRIA, and Order *Digynia*.

357. If it has two stamens, it falls under CLASS 2. DIANDRIA, the Order being *Monogynia*, *Digynia*, or *Trigynia*, as it has one, two or three pistils.

With respect to the Genera and Species, more practice is required, but the elementary parts of the whole science, with common application, may be understood during the leisure hours of a single summer.

EXAMINATION OF THE FLOWER.

Before illustrating the Classes and Orders by examples, we shall make a few observations on the *examination* of Flowers, with the view of assisting the pupil in referring them to their proper places in the scientific arrangement.

In order to determine the name of an unknown plant, it is necessary to find its place in the Linnæan System. This to the beginner who has no assistant but his Manual, is often a

355. If a flower has only one pistil and one stamen, where does it belong?—356. If it has one stamen and two pistils, where is its place?—357. If it has two stamens, where is its place?

very puzzling process. Even to the experienced botanist, every unknown flower requires critical inspection, and without which he cannot determine its scientific relations.

A good lens is necessary for many plants, and should always be carried into the field in order to be used. Small tender plants should be examined while growing, or when carried home should be immediately placed in water.

1. In the first ten classes the parts which claim the chief attention, are the stamens and pistils, and here to determine the Class and Order, little or nothing more is required than to count their number. If the flower has five stamens, all separate, it belongs to PENTANDRIA, and if only a single style, its Order is *Monogynia*.

2. In the examination of the Calyx and Corolla, for the purpose of determining the genus, much caution is necessary, lest the number of divisions in the first, should be mistaken for the number of sepals, and those of the second, for the number of petals. In the first place examine the Corolla by pulling off each petal, or division separately. If it is found that they cohere, or grow together at the base, the Corolla is *monopetalous*, and the petals, instead of being distinct parts, as in a *polypetalous* Corolla, are merely deep divisions. The flowers of the Iris, for example, though monopetalous, might easily be mistaken for a Corolla with six petals.

3. The Corolla being examined and removed, the Calyx, if deeply divided, should be examined

in the same manner. Every Calyx, the leaves or sepals of which are joined, is *monophyllous*, or single-leaved, however deeply it may be divided. In the Violet, for example, the Calyx consists of five sepals, each of which may be removed separately, and without disturbing the others. In the Rose, and Apple, the Calyx is five-cleft, the divisions all being united at the base. In the Violet, therefore, the Calyx is many-sepalled; but in the Rose and the Apple, it is one-sepalled, with five divisions.

4. In many flowers, the stigmas are so long, or deeply cleft, as easily to be mistaken for styles. It is necessary, therefore, in the examination of these parts, to ascertain whether they unite below, in which case only one style is to be counted. The Iris, for example, has three petaloid stigmas, but only one style.

5. In many of the Classes, particularly in the *fifth*, *sixth*, and *tenth*, the genera are often distinguished by the *superior* or *inferior* situation of the Calyx or Corolla, or both. Sometimes also, these parts are *half* superior. These points are easily determined. When the Calyx, or Corolla, is situated below the germen, or includes this part within its whorl, then the Calyx or Corolla is *inferior*, as in the Lily and Pink; the former being an example of an inferior Corolla, and the latter of an inferior Calyx and Corolla.

When these parts are situated on the germen, but do not include it, then the Calyx, or Corolla

is said to be *superior*, as in the Apple, Pear, and Hydrangea.

When the germen is placed partly above and partly below the Calyx or Corolla, then these parts are *half* superior or *half* inferior.

6. In the examination of flowers containing *many* stamens, it is required to ascertain whether these parts are situated on the Calyx or not. If there are many stamens, that is, more than twenty, placed on the Calyx, the plant falls into the Class ICOSANDRIA; but if these parts are inserted *under* the germen, and on that part called the receptacle, it comes within the class POLYANDRIA.

7. If the plant has four stamens, two of which are longer than the others, it belongs to the Class DIDYNAMIA. Plants of this description form the natural Order, called the *Labiata*, or lipped tribe, as Mint and Horehound.

8. If the flower has six stamens, two of which are shorter than the others, its Class is TETRADYNAMIA. Plants of this kind form the natural Order, called the *Cruciform* tribe, of which, Cabbage, Mustard and Horse-radish are examples.

9. It is generally easy to determine whether the filaments of the stamens are separate at the base, or not. We have seen, that in the first ten Classes, these parts are entirely distinct, throughout. If the filaments are united or cohere in any part of their length, or at their bases, then the plant falls under some Class not

yet mentioned. If the union is entire, forming only one parcel, the specimen belongs to MONADELPHIA, as the Geranium and Mallows. If the filaments are united in two sets, or parcels, however unequal in number, the flower falls into the Class DIADELPHIA. The Pea is an example. In this there are nine stamens in one set, and one in the other.

In some instances the filaments are united into more than two parcels, in which case the specimen is thrown into the Class POLYADELPHIA.

10. In the examination of the Compound Flower, or the Class SYNGENESIA, the beginner will find some difficulty in distinguishing one part from another in such a manner as to satisfy himself concerning the Orders. But the mode of examination is so simple as hardly to require any directions, since little is to be done more than to distinguish the *stamens* from the *pistils*, the *disk* from the *ray*, and the *tubular* from the *ligulate* florets. With respect to the genera, however, there is more difficulty, nor will any thing short of actual experience, give the botanist the knowledge which is required to make accurate distinctions in this part of the science.

11. In the Class GYNANDRIA, the flowers are so peculiar and differ so materially from all others, that after having examined a few specimens, the pupil will in general be able to refer the others to their proper stations without difficulty.

Nearly all the plants of this Class belong to Order 1. The stamens, or stigmas, instead of being situated around the germen as in the other Classes, are placed on the style, or stigma itself. Nor do these parts resemble the stamens and pistils of other plants, but consist of solitary, fleshy, undivided processes or masses, which appear more like the nectaries of other plants than like the essential organs of reproduction.

12. In the Class *MONÆCIA*, where the stamens and pistils reside in separate flowers, on the same plant, the difference between the staminate and pistillate ones is generally quite apparent. The pupil on taking notice of the flowers of the Cucumber, Squash or Melon, will, in a moment, see which are barren and which fruitful. The stamens are on long stalks near the roots, while the pistils are on the vines and appear afterwards.

13. In the Class *DICÆCIA* the stamens and pistils reside on different plants, and there is in some cases, but little difference between the fruitful and barren aments, except the presence of the yellow dust, or pollen on the stameniferous tree. But the pupil, with the assistance of botanical descriptions, will soon be able to distinguish the barren, from the pistiliferous trees, and the satisfaction of doing so will amply satisfy him for his trouble, since this class contains some of the noblest genera of the forest, as the Palms and Poplars.

14. Plants belonging to **POLYGAMIA** have perfect flowers, together with barren or fertile ones, or both, on the same, or on separate plants. The Maple and Ash trees are examples.

The flowers of this, require the same kind of examination, as those of the two former Classes.

With respect to the Class **CRYPTOGAMIA**, it is hardly to be expected that the young pupil can do much with it, though one of the most interesting of all the Classes.

NAMES OF THE CLASSES AND ORDERS OF THE LINNÆAN SYSTEM.

Illustrated chiefly by examples of the most common North American Plants.

The design of this table is to enable the beginner to ascertain where any plant contained in the list, belongs, so that having referred it to its place, he may then observe how the several parts of the flower agree with the terms of the Class and Order. Those who have learned botany without an instructor, will see the advantage of this plan. By knowing at once where to refer such flowers as those of the Milkweed tribe for instance, the untaught student would be saved much trouble and perplex-

ity owing to the peculiarity of their flowers. The same may be said with respect to the Iris, the Golden Club, and many other flowers. Besides this, the progress of the student may be greatly facilitated by having in his possession both the botanical and common names of such plants as are most likely to fall within his notice, during his botanical excursions.

After this Synopsis of the Classes and Orders, there will follow such explanations of each Class as we think the student requires, together with descriptions of curious and interesting plants, whether native or foreign, as illustrations.

CLASS I.—MONANDRIA. 1 *Stamen*. ORDERS 2.

ORDER 1.—MONOGYNIA. One Pistil.

Example. *Salicornia*, (*Saltwort*, *Glasswort*.)
Hippuris, (*Mare's Tail*.)

ORDER 2.—DIGYNIA. Two Pistils.

Ex. *Callitriche*, (*Water Starwort*.)

CLASS II.—DIANDRIA. 2 *Stamens*. ORDERS 3.

ORDER 1.—MONOGYNIA. One Pistil.

Ex. *Veronica*, (*Speedwell*),
Utricularia, (*Bladderwort*),
Collinsonia, (*Horse-weed*),
Lemna, (*Duck meat*.)

ORDER 3.—TRIANDRIA. Three Pistils.

Ex. *Piper*, (*Black Pepper*.)

CLASS III.—TRIANDRIA. 3 *Stamens*. ORDERS 3.

ORDER 1.—MONOGYNIA. One Pistil.

- Ex. Iris, (*Flower-de-Luce*,)
 Scirpus, (*Club rush*.)

ORDER 2.—DIGYNIA. Two Pistils.

- Ex. Triticum, (*Wheat*,)
 Leersia, (*Rice grass*,)
 Agrostis, (*Bent grass*.)

ORDER 3.—TRIGYNIA. Three Pistils.

- Ex. Lechea, (*Pin weed*,)
 Mollugo, (*Carpet weed*.)

CLASS IV.—TETRANDRIA. 4 *Stamens*. ORDERS 3.

ORDER 1.—MONOGYNIA. One Pistil.

- Ex. Plantago, (*Plantain*,)
 Cornus, (*Dogwood*,)
 Mitchella, (*Chequer berry*.)

ORDER 2.—DIGYNIA. Two Pistils.

- Ex. Hamamelis, (*Witch Hazel*,)
 Sanguisorba, (*Canada Thistle*.)

ORDER 3.—TETRAGYNIA. Four Pistils.

- Ex. Ilex, (*Holly*,)
 Potamogeton, (*Pond weed*.)

CLASS V.—PENTANDRIA. 5 *Stamens*. ORDERS 7.

ORDER 1.—MONOGYNIA. One Pistil.

- Ex. Lysimachia, (*Loosestrife*,)
 Datura, (*Thorn apple*,)

Verbascum, (*Mullein*,)
 Viola, (*Violet*,)
 Lobelia, (*Cardinal Flower*.)

ORDER 2.—DIGYNIA. Two Pistils.

Ex. Asclepias, (*Milkweed*,)
 Gentiana, (*Gentian*,)
 Chenopodium, (*Goose-foot, Pig-weed*,)
 Daucus, (*Carrot*,)
 Cicuta, (*American Hemlock*,)
 Uraspermum, (*Sweet Sicily*.)

ORDER 3.—TRIGYNIA. Three Pistils.

Ex. Staphylea, (*Bladder-tree*,)
 Rhus, (*Sumac*,)
 Viburnum, (*Arrow-wood*.)

ORDER 4.—TETRAGYNIA. Four Pistils.

Ex. Parnassia, (*Grass of Parnassus*.)

ORDER 5.—PENTAGYNIA. Five Pistils.

Ex. Linum, (*Flax*,)
 Statice, (*Marsh Rosemary*,)
 Armeria, (*Thrift*.)

ORDER 6.—HEXAGYNIA. Six Pistils.

Ex. Drosera, (*Sun-dew*.)

ORDER 7.—POLYGYNIA. Many Pistils.

Ex. Xanthoriza, (*Yellow-root*.)

CLASS VI.—HEXANDRIA. 6 Stamens. OR
 DERS 5.

ORDER 1.—MONOGYNIA. One Pistil.

Ex. Lilium, (*Lily*,)
 Convallaria, (*Solomon's Seal*,)

Erythronium, (*Dog's Tooth Violet*,)
 Orontium, (*Golden Club*.)

ORDER 2.—DIGYNIA. Two Pistils.

Ex. Oryza, (*Rice*.)

ORDER 3.—TRIGYNIA. Three Pistils.

Ex. Medeola, (*Cucumber Root*,)
 Rumex, (*Dock*.)

ORDER 4.—TETRAGYNIA. Four Pistils.

Ex. Saururus, (*Lizard's Tail*.)

ORDER 5.—POLYGYNIA. Many Pistils.

Ex. Alisma, (*Water Plantain*.)

CLASS VII.—HEPTANDRIA. 7 *Stamens*. OR-
 DERS 4.

ORDER 1.—MONOGYNIA. One Pistil.

Ex. Trientalis, (*Chickweed-Wintergreen*,)
 Æsculus, (*Horse Chestnut*.)

CLASS VIII.—OCTANDRIA. 8 *Stamens*. OR-
 DERS 4.

ORDER 1.—MONOGYNIA. One Pistil.

Ex. Epilobium, (*Willow-herb*,)
 Oxycoccus, (*Cranberry*.)

ORDER 2.—DIGYNIA. Two Pistils.

Ex. Chrysosplenium, (*Golden Saxifrage*.)

ORDER 3.—TRIGYNIA. Three Pistils.

Ex. Polygonum, (*Knot Grass*.)

CLASS IX.—ENNEANDRIA. 9 *Stamens*. OR-
 DERS 3.

ORDER 1.—MONOGYNIA. One Pistil.

Ex. *Laurus*, (*Sassafras*, *Spice-bush*.)

ORDER 3.—TRIGYNIA. Three Pistils.

Ex. *Rheum*, (*Rhubarb*.)

CLASS X.—DECANDRIA. 10 *Stamens*. ORDERS 5.

ORDER 1.—MONOGYNIA. One Pistil.

Ex. *Kalmia*, (*Laurel*, *Ivy*.)

Pyrola, (*Wintergreen*.)

Gaultheria, (*Partridge-berry*.)

ORDER 2.—DIGYNIA. Two Pistils.

Ex. *Saxifraga*, (*Saxifrage*.)

Saponaria, (*Soap wort*.)

ORDER 3.—TRIGYNIA. Three Pistils.

Ex. *Stellaria*, (*Chickweed*.)

Arenaria, (*Sandwort*.)

ORDER 5.—PENTAGYNIA. Five Pistils.

Ex. *Spergula*, (*Corn spurrey*.)

Penthorum, (*Five Horns*.)

ORDER 10.—DECAGYNIA. Ten Pistils.

Ex. *Phytolacca*, (*Poke*, or *Scoke*.)

CLASS XI.—DODECANDRIA. 12 *Stamens*. ORDERS 5.

ORDER 1.—MONOGYNIA. One Pistil.

Ex. *Asarum*, (*Wild Ginger*.)

Portulaca, (*Purslane*.)

ORDER 2.—DIGYNIA. Two Pistils.

Ex. *Agrimonia*, (*Agrimony*.)

ORDER 2.—TRIGYNIA. Three Pistils.

Ex. Euphorbia, (*Spurge.*)

CLASS XII.—ICOSANDRIA. *Twenty or more Stamens inserted on the Calyx.* ORDERS 3.

ORDER 1.—MONOGYNIA. One Pistil.

Ex. Prunus, (*Wild Cherry,*)
Cactus, (*Prickly Pear.*)

ORDER 2.—DIGYNIA. Two Pistils.

Ex. Cratægus, (*Thorn Bush.*)

ORDER 3.—TRIGYNIA. Three Pistils.

Ex. Sorbus, (*Mountain Ash.*)

ORDER 5.—PENTAGYNIA. Five Pistils.

Ex. Pyrus, (*Apple, Pear.*)
Spiræa, (*Meadow Sweet.*)

ORDER 6.—POLYGYNIA. Many Pistils.

Ex. Rosa, (*Rose,*)
Rubus, (*Blackberry, Raspberry,*)
Geum, (*Avens.*)

CLASS XIII.—POLYANDRIA. *Many Stamens.*
ORDERS 7.

ORDER 1.—MONOGYNIA. One Pistil.

Ex. Sarracenia, (*Side Saddle Flower,*)
Sanguinaria, (*Bloodroot,*)
Tilia, (*Basswood,*)
Nymphæa, (*Water Lily.*)

ORDER 5.—PENTAGYNIA. Five Pistils.

Ex. Aquilegia, (*Columbine.*)

ORDER 6.—POLYGYNIA. Many Pistils.

- Ex. Clematis, (*Maiden's bower*,)
 Coptis, (*Gold thread*,)
 Ranunculus, (*Crowfoot*.)

CLASS XIV.—DIDYNAMIA. *Four Stamens, two of which are longer than the others.* ORDERS 2.

ORDER 1.—GYMNOSPERMIA. *Seeds naked.*

A. *Calyxes mostly five cleft.*

- Ex. Mentha, (*Mint*,)
 Verbena, (*Vervain*,)
 Leonurus, (*Motherwort*.)

B. *Calyxes two-lipped.*

- Ex. Scutellaria, (*Scullcap*,)
 Prunella, (*Self-heal*.)

ORDER 2.—ANGIOSPERMIA. *Seeds in a vessel.*

- Ex. Bartsia, (*Painted Cup*,)
 Pedicularis, (*Lousewort*,)
 Mimulus, (*Monkey Flower*,)
 Chelone, (*Snake-head*.)

CLASS XV.—TETRADYNAMIA. *Six Stamens, four long and two short.* ORDERS 2.

ORDER 1.—SILICULOSA. *Seeds in a short pod.*

- Ex. Lepidium, (*Pepper-grass*,)
 Thlaspi, (*Shepherd's Purse*.)

ORDER 2.—SILIUOSA. *Seeds in a long pod.*

- Ex. Sinapis, (*Mustard*,)
 Raphanus, (*Radish*,)
 Dentaria, (*Toothwort*.)

CLASS XVI.—MONADELPHIA. *Filaments united, at least through a part of their length, into one parcel.* ORDERS 7.

ORDER 1.—TRIANDRIA. Three Stamens.

Ex. *Sisyrinchium*, (*Blue-eyed grass.*)

ORDER 5.—PENTANDRIA. Five Stamens.

Ex. *Passiflora*, (*Passion flower.*)

ORDER 10.—DECANDRIA. Ten Stamens.

Ex. *Geranium*, (*Cranesbill.*)

ORDER 11.—POLYANDRIA. Many Stamens.

Ex. *Sida*, (*Indian Mallow,*)

Malva, (*Mallow,*)

Hibiscus, (*Hibiscus.*)

CLASS XVII.—DIADELPHIA. *Stamens united into two distinct parcels or sets.* ORDERS 4.

ORDER 2.—HEXANDRIA. Six Stamens.

Ex. *Fumaria*, (*Fumatory,*)

Corydalis, (*Corydalis.*)

ORDER 3.—OCTANDRIA. Eight Stamens.

Ex. *Polygala*, (*Milkwort, Snakeroot.*)

ORDER 4.—DECANDRIA. Ten Stamens.

Ex. *Crotolaria*, (*Rattle-pod,*)

Phaseolus, (*Kidney bean,*)

Trifolium, (*Clover,*)

Robinia, (*Locust tree.*)

CLASS XVIII.—POLYDELPHIA. *Stamens united into more than two parcels.* ORDERS 3.

ORDER POLYANDRIA. Many Stamens.

Ex. *Hypericum*, (*St. John's wort,*)

Citrus, (*Orange, Lemon.*)

CLASS XIX.—SYNGENESIA. *Anthers united by their edges into a cylinder. Flowers compound, or collected into heads.* ORDERS 5.

ORDER 1.—ÆQUALIS. *Florets of the disk and ray all fertile, being furnished with stamens and pistils.*

A. *Florets all ligulate, or strap shaped.*

Ex. *Leontodon*, (*Dandelion*,)

Lactuca, (*Lettuce*,)

Hieracium, (*Hawkweed*.)

B. *Florets all tubular and erect, forming nearly a level top.*

Ex. *Eupatorium*, (*Boneset*,)

Bidens, (*Burr-marygold*.)

ORDER 2.—SUPERFLUA. *Florets of the ray obsolete; those of the disk with pistils and stamens; all fertile.*

Ex. *Artemisia*, (*Wormwood*,)

Gnaphalium, (*Life Everlasting*.)

C. *Florets radiate, and ligulate.*

Ex. *Aster*, (*Starwort*,)

Solidago, (*Golden rod*,)

Senecio, (*Groundsel*,)

Anthemis, (*Mayweed*.)

ORDER 3.—FRUSTRANEA. *Florets of the disk with stamens and pistils, and fertile; those of the ray with stamens only, and barren.*

Ex. *Helianthus*, (*Sun-flower*,)

Coreopsis, (*Tickseed-sun-flower*,)

Rudbeckia, (*Rudbeckia*.)

ORDER 4.—NECESSARIA. *Florets of the disk with sta-*

mens but no pistils, and therefore barren; those of the ray, with pistils only, and fertile.

- Ex. *Calendula*, (*Marygold*,)
Iva, (*False Jesuit's Bark*.)

ORDER 5.—SEGREGATA. *Besides the common involucre, each floret has its distinct perianth.*

- Ex. *Elephantopus*, (*Elephant's foot*,)
Echinops, (*Globe Thistle*.)

CLASS XX.—GYNANDRIA. *Stamens placed on the pistils or germen.* ORDERS 7.

ORDER 1.—MONANDRIA. One Stamen.

- A. *Anther terminal, erect; pollen granular, cohering by an elastic thread.*

- Ex. *Orchis*, (*Orchis*,)
Habernaria, (*Habernaria*.)

- B. *Anther parallel with the stigma; pollen powdery.*

- Ex. *Neottia*, (*Bird's Nest*,)
Spiranthes, (*Ladies' Tresses*.)

- C. *Anther terminal, persistent; pollen powdery.*

- Ex. *Arethusa*, (*Arethusa*,)
Pogonia, (*Pogonia*,)
Calopogon, (*Calopogon*.)

- D. *Anther terminal, opercular, deciduous; pollen waxy.*

- Ex. *Cymbidium*, (*Tuberous Cymbidium*,)
Malaxis, (*Malaxis*.)

ORDER 2.—DIANDRIA. Two Stamens.

- Ex. *Cypripedium*, (*Ladies' Slipper*.)

ORDER 3.—HEXANDRIA. Six Stamens.

Ex. *Aristolochia*, (*Virginia snake-root.*)

CLASS XXI.—MONŒCIA. *Stamens and pistils in different flowers, but on the same plant, so that some flowers are fruitful, while others are barren.*

ORDERS 8.

ORDER 1.—MONANDRIA. One Stamen.

Ex. *Zostera*, (*Grass-wack, Eel-grass,*)
Zannichellia, (*Horned Pond-weed.*)

ORDER 3.—TRIANDRIA. Three Stamens.

Ex. *Eriocaulon*, (*Pipewort,*)
Carex, (*Sedge Grass,*)
Typha, (*Water Flag,*)
Comptonia, (*Sweet Fern,*)
Zea, (*Indian Corn.*)

ORDER 4.—TETRANDRIA. Four Stamens.

Ex. *Alnus*, (*Common Alder,*)
Urtica, (*Nettle,*)
Morus, (*Mulberry.*)

ORDER 5.—PENTANDRIA. Five Stamens.

Ex. *Ambrosia*, (*Bitterweed, Roman wormwood,*)
Xanthium, (*Sea Burdock.*)

ORDER 6.—HEXANDRIA. Six Stamens.

Ex. *Zizania*, (*Wild Rice, Water Oats.*)

ORDER 7.—POLYANDRIA. Many Stamens.

Ex. *Sagittaria*, (*Arrow-head,*)
Arum, (*Indian Turnip,*)
Castanea, (*Chestnut tree,*)
Quercus, (*Oak,*)

Juglans, (*Walnut*.)

ORDER 8.—MONADELPHIA. *Stamens united into a single body.*

Ex. Pinus, (*Pine, Spruce*),
Thuya, (*Hacmatac*.)

CLASS XXII.—DICECIA. *Stamens and pistils on different plants, one being barren and the other fruitful.* ORDERS 8.

ORDER 2.—DIANDRIA. Two Stamens.

Ex. Vallisneria, (*Vallisneria*),
Salix, (*Willow*.)

ORDER 3.—TRIANDRIA. Three Stamens.

Ex. Empetrum, (*Crowberry*.)

ORDER 4.—TETRANDRIA. Four Stamens.

Ex. Myrica, (*Bayberry, Wax Myrtle*.)

ORDER 5.—PENTANDRIA. Five Stamens.

Ex. Humulus, (*Common Hop*),
Acnida, (*Acnida*.)

ORDER 6.—HEXANDRIA. Six Stamens.

Ex. Smilax, (*Green Briar*),
Dioscoria, (*Dioscoria*.)

ORDER 7.—OCTANDRIA. Eight Stamens.

Ex. Populus, (*Poplar*),
Diospyrus, (*Persimmon*.)

ORDER 8.—ENNEANDRIA. Nine Stamens.

Ex. Elodea, (*Elodea*.)

ORDER 9.—DECANDRIA. Ten Stamens.

Ex. Gymnocladus, (*Coffee-bean tree*.)

ORDER 10.—POLYANDRIA. Many Stamens.

Ex. Menispermum, (*Moonseed.*)

ORDER 11.—MONADELPHIA. *Stamens united into one body.*

Ex. Juniperus, (*Juniper, Red Cedar.*)
Taxus, (*Dwarf Yew.*)

CLASS XXIII.—POLYGAMIA. *Perfect flowers together with barren, or fertile ones, or both, on the same, or on separate plants.* ORDERS 3.

ORDER 1.—MONŒCIA. *Barren, fertile, and perfect flowers, on the same plant.*

Ex. Veratrum, (*Hellebore.*)
Celtis, (*Nettle tree.*)

ORDER 2.—DICECIA. *Barren, fertile and perfect flowers, on distinct plants.*

Ex. Panax, (*Ginseng.*)
Xanthoxylum, (*Prickly Ash.*)
Acer, (*Maple.*)
Fraxinus, (*Ash.*)

CLASS XXIV.—CRYPTOGAMIA. *Stamens and pistils concealed, imperfectly formed, or wanting.* ORDERS 8.

ORDER 1.—FILICES. *Ferns. Fruit mostly placed on the back of the frond.*

Ex. Polypodium, (*Polypody.*)
Osmundia, (*Flowering Fern.*)
Asplenium, (*Shield Fern.*)

ORDER 2.—EQUISETACEA. (*Horsetail.*)

Ex. Equisetum, (*Scouring Rush.*)

ORDER 3.—LYCOPODINEÆ. (*Club Mosses.*) *Reproductive organs axillary, spiked. Thecæ in grains, or masses.*

Ex. *Lycopodium*, (*Club Moss.*)

ORDER 4.—MUSCI. (*Mosses.*) *Dry herbs with distinct leaves, producing seed-vessels, furnished with lids, and containing sporules.*

The Mosses belonging to this order are chiefly found in moist places in the woods, and in sheltered situations among the rocks.

ORDER 5.—HEPATICÆ. (*Liverworts.*) *Herb, a frond, the capsules not generally opening with a lid, as in the Mosses.*

These plants are chiefly found on rocks, old walls, and the bark of trees.

ORDER 6.—ALGÆ. (*Flags.*) *Seeds embedded in the substance of the frond; plants chiefly aquatic and sub-merged.*

Ex. *Fucus nodosus*, (*Sea Rock Weed.*)

ORDER 7.—LICHENS. (*Rock and Tree Mosses.*) *Leafless, flowerless, perennial plants, with a thallus and external disk containing sporules.*

They are found on old wood fences, rocks, and the bark of trees.

Ex. *Cetraria*, (*Iceland Moss.*)
Lecanora, (*Cudbear.*)

ORDER 8.—FUNGI. (*Mushrooms.*) *Sporules or seeds arranged in tubular cells, placed in some part of the external surface, often in the lamellæ, or gills. Frond none.*

Ex. *Agaricus Campestris*, (*Eatable Mushroom.*)

This order comprehends all the Mushrooms, vulgarly called *Toad-stools*, of which there are several thousand species and varieties.

EXPLANATION OF THE CLASSES.

Having thus given examples of several genera belonging to each Order, thus also fully illustrating every Class by the most familiar and common plants, we now proceed to explain each Class separately, and hope to do so, in such a manner as to be understood, even by those who begin their botany with this little volume.

It will be needless to repeat under the name of each Order, the number of stamens on which the Class is founded. Nor will it be necessary to again show the number of Orders composing each Class, both being contained in the above Synopsis. A figure will be found in connection with the name of each Class, representing the parts of the flower on which the Class is founded. In the first ten Classes this illustrates the Class, and the first Order, but no more. Thus at Class first, the cut shows one stamen and one pistil, and at Class second, two stamens, and one pistil, and so of the others. The stamens are marked *a* and the pistils *b*. The Classes are marked by the twenty-four letters of the alphabet.

CLASS I.—MONANDRIA. *One Stamen.*

Fig. A. 1. Any plant having a single stamen falls into this Class, Fig. A. *a* stamen, *b* pistil.



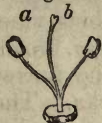
Monandria is not a large Class, but it contains some plants of value, among which are the Ginger, Cardamom, and Turmeric.

ORDER 1.—MONOGYNIA. *One Pistil.*

2. This is the place of the plant which produces the Ginger root, a spice well known to all our young friends. These roots are taken from the ground when the stalk begins to fade, and being scalded, dried and ground to powder, the ginger is fit for use.

CLASS II.—DIANDRIA. *Two Stamens.*

Fig. B. 3. Any flower having only two stamens, belongs to this Class, Fig. B. *a* stamen, *b* pistil.



This is rather a small Class, though it contains several plants of use, and some ornamental flowers.

ORDER 1.—MONOGYNIA. *One Pistil.*

4. Sage is one of the plants of this Order, of which there are 120 species.

1. How many stamens has the Class Monandria?—2. How many pistils in the Order Monogynia and what common spices belong to this Class and Order?—3. How many stamens has Diandria?—4. What garden aromatic belongs here?

5. *Nyctanthes*, which means the *night tree*, is another of this Order. It is also called the *sorrowful tree*, because during the day it droops its leaves and seems to wither; but after the sun goes down, it erects them again, and during the night appears fresh and flourishing. In the day time it has no fragrance, but in the night it blossoms and then sends forth the most delightful fragrance. It is a native of the East, but is now cultivated in England.

ORDER 2.—DIGYNIA. Two Pistils.

This Order contains no interesting plants.

ORDER 3.—TRIGYNIA. Three Pistils.

Fig. 137.



6. The genus *Piper*, (Black pepper,) is a member of this Order. Of this genus there are about sixty species. That producing the Black pepper of our tables, is a climbing vine, with large leaves, which are broad, ovate, and acuminate. The flower has neither Calyx, nor Corolla. The fruit is borne on a kind of spadix, suspended in the manner represented by Fig. 137.

5. What is said of the *nyctanthes*?—6. What account can you give of the black pepper plant?

CLASS III.—TRIANDRIA. *Three Stamens.*

Fig. C.

Fig. C, *a* the three *stamens*,
b the *pistil*.

7. This Class is much more extensive than either of the others.

8. It contains the Grasses, the Irises, the Club-rushes, the beautiful Crocus and many other useful or interesting genera.

ORDER 1.—MONOGYNIA. One Pistil.

9. The genus *Iris* is a member of this Order. The name signifies *rain-bow*, in allusion to the number of colors the flower contains. The common name is *Flower-de-luce*.

10. The genus contains sixty species, one of which, with its fine blue flower, is the chief ornament of our low grounds and meadows.

11. The genus is distinguished by its having a six-parted flower, every other division of which is rolled backwards, the stigmas being petaloid, or shaped like petals.

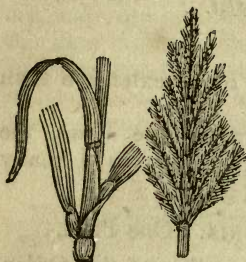
ORDER 2.—DIGYNIA. Two Pistils.

12. This order includes the Sugar cane,

7. What is said of the extent of the class Triandria?—8. What common plants does Triandria contain?—9. What does iris signify?—10. How many species has this genus?—11. How is this genus distinguished?—12. What important plants does the Order Dyginia include?

Wheat, Rye, Barley and Oat, and therefore embraces a group of plants more useful to man than perhaps any other Order in the whole system.

Fig. 139.



13. The Sugar Cane, (*Saccharum*,) Figure 139, grows from eight to twelve feet high, with a jointed stem, similar to Indian corn. The flowers are in a panicle; glumes two-valved, two-flowered, and enveloped in a woolly substance. The stem of this plant is

a *culm*, so that in botany it is considered as one of the grasses.

14. Sugar is obtained from these culms, by grinding them in a mill, submitting the broken parts to pressure, and purifying the juice, which it yields in large quantities.

15. Sugar was first used in England in about the year 1486, when it was only employed as a medicine, and offered by the wealthy at feasts. The luxury of sweetened tea and coffee was then unknown.

13. What is said of the sugar-cane?—14. How is sugar obtained?—15. When was sugar first used in England and for what purposes?

CLASS IV.—TETRANDRIA. *Four Stamens.*

Fig. D.



16. Fig. D, *a*, the *stamens*, *b*, the *pistil*. The stamens are all of the same length. This class is neither so large, nor important as the last. It contains however many foreign shrubs of great beauty, and some native plants which are common or interesting.

ORDER 1.—MONOGYNIA. *One Style.*

17. This is a large order, containing more than a hundred genera. Among these are the *Protea*, and *Banksia*, the first a native of the Cape of Good Hope, and the second a native of New Holland. These are both among the most magnificent and beautiful of vegetables.

18. The Skunk Cabbage, (*Pothos fœtida*), which grows abundantly in our swamps, is a member of this order. The flower of this appears in the early spring, and before the leaves are to be seen. This flower is a curiosity. The *spadix* is oval, and is contained in a *spathe*, which is spotted with red and yellow. The florets are crowded, and each one, on close inspection will be found to contain four stamens and one pistil. Some weeks after the flower, large

16. How many stamens has the class Tetrandria?—17. What beautiful foreign plants belong to the first order?—18. What account is given of the skunk cabbage?

radical leaves unfold themselves around it, which continue during the summer.

19. Of the genus *Cornus*, or Dogwood, we have about twelve species in our woods.

20. The common Dogwood, (*Cornus Florida*), is a large shrub growing on moist ground.

21. It flowers in May, and its large white involucre give it a very showy appearance, especially when contrasted with other trees by which it is surrounded, which are just then unfolding their leaves. The involucre of this flower is often mistaken for petals.

22. The genus *Plantago* belongs here. Two species of this, the *broad* and *narrow* leaved Plantain are known to every child. The broad leaved grows on the sides of foot-paths about houses. It is strictly a domestic plant, being rarely seen at a distance from habitations. The narrow leaved called also *ribwort*, is found abundantly in rich fields. The spike is dark, with white projecting stamens. Leaves oblong lanceolate, with nearly parallel, and very conspicuous ribs.

23. The Chequer berry, (*Mitchella*), is a pretty little creeping evergreen plant, which is very common in shady places among trees. The leaves are ovate, a little cordate and opposite.

19. How many species of the *Cornus* have we?—20. What kind of a tree is the common dogwood?—21. What part of the flower of this plant is the most showy?—22. What is said of the two species of plantain?—23. What is the appearance of the chequer berry?

24. The flowers are white with a blush of red, and have the most delightful fragrance imaginable. These flowers are twins, two being situated on each germen. The fruit is a little red berry, which continues all winter.

25. This plant, if taken up with a little of the earth where it grows, is easily cultivated in a flower pot, and is much more beautiful and fragrant, than many foreign plants on which much care is bestowed.

This class and order also contains a little plant growing in England, about the shady banks of rivulets, and well known under the name of Sweet Woodruff. The old English spelling of this word was *Woodderowffe*, and hence the rhyme which almost every one has heard repeated whether he can do it himself or not. It runs thus,

*Double U, double O, double D, E,
R, O, double U, double F, E.*

It will be seen that the rhyme spells the word. The botanical name of this plant is *Asperula odorata*.

24. What is there peculiar about its flowers?—25. What is said of the cultivation of this plant?

CLASS V.—PENTANDRIA. *Five Stamens*

Fig. E.



26. The name Pentandria comes from the Greek *pente*, five, and *aner*, a stamen, and therefore signifies five stamens.

27. Any plant having five stamens all separate, as in the figure, belongs here.

28. This Class is of such vast extent, as to contain about a fifth part of all the known plants, which contain visible stamens and pistils. It is, therefore, separated into several divisions.

ORDER 1.—MONOGYNIA. One Pistil.

29. This order comprehends so great a number of plants as to require several divisions, depending on the kind or situation of the corolla, the number of seeds, or the kind of seed-vessel.

30. Division 1.—*Corolla monopetalous, seeds two or more.*

31. Comfrey, Hounds-tongue, and Lung-wort are examples.

32. Division 2.—*Corolla monopetalous, inferior. Seeds in a capsule.*

33. Loose-strife, (*Lysimachia*), is an example. It bears a pretty yellow flower, and is

26. Whence comes the name Pentandria?—27. What botanical characters must a plant have to belong to Pentandria? 28. What is said of the extent of Class V.?—29. On what do the divisions of order 1 depend?—30. What are the characters of division 1?—31. What plants are examples?—32. What are the characters of division 2?—33. Give examples.

common in our low grounds. Tobacco, Morning-glory, Bind-weed, and Mullein are other examples.

34. Division 3.—*Corolla monopetalous, inferior. Seeds in a drupe or berry.*

35. Examples, Potato, Night-shade, and Red-pepper.

36. Division 4.—*Flowers monopetalous, superior. Seeds in a capsule.*

37. Cardinal flower, and Bell flower, are examples.

38. Division 5.—*Corolla many-petalled, inferior. Seeds in a capsule.*

39. Violet, Touch-me-not, and Claytonia are examples.

40. Division 6.—*Flowers polypetalous, superior.*

41. Currants and Gooseberry, are examples.

42. We have given the most common examples, that the learner might be able to compare the plants with the descriptions. Thus Morning glory has five stamens and one pistil; the corolla is inferior, that is, it surrounds the germen, or is situated below it; and the seeds are in a capsule. In the Currant there are many petals, and the corolla is situated above, or on the germen, and is therefore superior.

34. What are the characters of division 3?—35. Give examples.—36. What are the characters of division 4?—37. Give examples.—38. What are the characters of division 5?—39. Give examples.—40. What are the characters of division 6?—41. Give examples.—42. What descriptions can you give of the morning glory and currant?

43. The *Primula*, or Primrose, belongs to this place. It is called *Primula*, from *primus*, first, because it is one of the first flowers of spring.

Of the Primrose there is a great number of species and still more varieties. They are generally from three or four inches to a foot in height, and bear flowers of various colors as yellow, orange, red or purple.

Fig. 142.



44. The *Auricula* is a species of this genus, and few flowers have been more celebrated than this. The colors are innumerable, and some of the varieties of exquisite beauty and fragrance. It is only four or five inches high, bearing many funnel-shaped flowers on the

same stalk. Leaves *obovate* and surrounding the scape, Fig. 142.

45. Among the foreign plants belonging in this place, the Coffee tree is undoubtedly the most important. That which bears the Coffee of commerce is called *Coffee Arabica*, because it originally came from Arabia to Europe.

46. This tree grows from five, to eighteen feet high, and bears in three or four years after it is planted. The leaves are opposite, oblong, and of a shining light green color. Flowers in clusters, white, and of grateful odor. The ber-

43. What description can you give of the primrose?—44. What is said of the auricula?—45. What species of coffee is that which we use?—46. How large is the tree which bears coffee.

ries are two-seeded, the two flat surfaces being placed together in the capsule.

47. The decoction of this berry first began to be used in Europe, about the end of the 17th century, being brought there from Constantinople.

ORDER 2.—DIGYNIA. Two Pistils.

48. This order is not nearly so numerous as the first. It however contains many plants of importance either as food, medicine or ornament.

49. It includes the *Umbelliferous* tribe, the whole of which could only be described in an octavo volume.

50. Examples of this order which are most common, are Milk-weed, Beet, Elm tree, Carrot, Coriander, Gentian, Goose-foot, and Water-parsnip.

51. There is a curious genus belonging here called *Stapelia*, so named in honor of Dr. Stapel of Amsterdam. The plants came originally from the deserts of Africa, but are now cultivated on account of their singularity, in the botanic gardens of most countries. There is a great number of species, all of which partake of the same general characters and most of them have similar appearances. They are from three inches to a foot in height, and entirely without leaves. The stalks, or trunks are fleshy, often

47. When was coffee first used in Europe?—48. What is said of order 2?—49. What common plants are examples of order 2?—50. What extensive tribe of plants belong to this order?—51. What is said of the little plants named stapelia?

covered by projecting points, or tubercles, and terminate abruptly. From their sides there

Fig. 143.



springs now and then a short peduncle, bearing a large and sometimes beautiful flower. Fig. 143, represents the *Stapelia*, (*Varrucosa*), and will give a general notion of the whole tribe.

UMBELLIFEROUS TRIBE.

We have already explained that the name of this tribe arises from its peculiar mode of inflorescence.

52. The essential characters of this tribe are a *calyx* superior, either entire, or five-toothed; *petals* five; *stamens* five, alternate with the petals; *seed* pendulous, usually adhering to the end of the pedicel; *plants* herbaceous, with hollow, furrowed stems; *flowers* in umbels, color either white, pink, yellow, or blue.

53. Many of the seeds of this order are agreeable aromatics: Caraway, Fennel, Dill, Coriander, Parsley, Celery, Carrot, Parsnip, and Water Hemlock, are all umbelliferous plants. About 900 species of this tribe are known.

52. What are the essential characters of the umbelliferous tribe?—53. What common plants belong to this tribe?

ORDER 3.—TRIGYNIA. Three Pistils.

54. This order is small when compared with the two former.

55. It is the place of the Sumac, Elder, and Viburnum.

56. The *Snow-ball* shrub is a species of Viburnum. It is a well known perennial garden plant, producing large white flowers in the form of balls, whence its common name. This plant, by cultivation, has become a vegetable monster, the stamens and pistils having turned into petals so that it produces no seed, or fruit.

57. In our woods we have five or six species of Viburnum, several of which are worthy of the student's notice. The straight rods, with red bark, known by the name of *arrow wood*, are the growth of one of these shrubs.

ORDER 4.—TETRAGYNIA. Four Pistils.

58. The Grass of Parnassus, (*Parnassia*), is the only plant worthy of notice belonging here. Its name is derived from Mount Parnassus, where it was first found.

54. What is said of the extent of order 3?—55. What common plants belong to the third order?—56. What is said of the snow-ball, or viburnum?—57. What is said of the viburnums of our woods?—58. What plant is described under the fourth order?

Fig. 144.



59. The species here represented, Fig. 144, is a native of this country, and is called the *Carolina Parnassus*. This is about six inches high, with radical leaves, which are nearly round. The flower is white, single, and beset with a great number of little nectaries which might be mistaken for anthers.

ORDER 5.—PENTAGYNIA. Five Pistils.

60. Here belongs Flax, (*Linum*,) of which linen is made. It grows to the height of two or three feet, the stalk being a little larger than a knitting needle. At the top there is a loose corymb of blue flowers which give place, when the seed is ripe, to round capsules about the size of small peas. These contain the seed, of which the linseed oil, used in painting houses, is made. The use of flax was known in the days of Moses.

61. Sun-dew, (*Drosera*,) is a pretty little plant which has a place here. The leaves are spread upon the ground, their shape round, and their edges fringed with nectaries or glands, which are always covered with drops of clear liquor, although exposed to the heat of the sun;

59. What peculiarity does this plant present?—60. What important plant belongs to the fifth order?—61. What curious little plant also belongs here?

hence the name. In the midst of the leaves a scape rises two inches high, bearing white flowers.

62. Sea-pink, or Thrift, and Sea-lavender, also belong to this place. The former is a good example, of a scape bearing a *Capitum* or head of flowers.

CLASS VI.—HEXANDRIA. *Six Stamens.*

Fig. F.



63. The name of this class comes from the Greek *hex*, six, and *aner*, a stamen. The number of stamens is six and all of similar length.

64. This is a very important class to the florist, and young botanist, as it contains many of the most beautiful and common garden flowers, several of which display their stamens and pistils in a manner so conspicuous as not to be mistaken. The Lily, Tuberose, Crown Imperial, Tulip, Hyacinth, Amaryllis, and the Snow-drop, are all among the greatest beauties of the vegetable kingdom. Here also belong several esculent plants of great value, as Rice, Pine Apple, Asparagus, and the Plantain tree, an important tree in hot climates.

62. What plant is said to present a good example of a scape and capitum?—63. Whence comes the name of the sixth class?—64. What is said of the importance of this class?—what favorite flowers and esculent plants of value belong to this class?

ORDER 1.—MONOGYNIA. One Pistil.

65. This is the largest and much the most important order. It contains the Lily, Amaryllis, Bamboo, Fan Palm, Aloe, Tulip, Lily of the Valley, Star of Bethlehem, Hyacinth, Solomon's Seal, Crown Imperial, and many other beauties, or important plants.

66. Amaryllis is a most superb genus of the Lily tribe, containing a great number of species. The characters of the genus are, flower nodding, irregular funnel-shaped and gaping, or ringent, filaments declinate, or falling down, stigma three lobed.

67. The species *Jacoea*, called *Jacob's Lily*, is four or five inches high, the petals gracefully curved, of a dark red color, and velvet lustre, forming on the whole, a flower of remarkable beauty. This is an American species.

Fig. 146.



68. The Aloe genus consists of a large number of odd looking, thick-leaved plants which are natives of hot climates. The medicine called *aloes* is the dried juice of one species. Fig. 146 represents the species *variegata*. The leaves are radical, three-cornered, rigid and pointed, forming at the base an entire mass. In the centre rises the

65. What is said of the first order, and what plants are enumerated as belonging to it?—66. What is said of the amaryllis?—67. What American species of amaryllis is mentioned?—68. What is the general appearance of the aloe genus?

scape, three or four feet high, bearing many pink flowers. The whole genus came originally from Africa, but is now cultivated in hot-houses in most parts of the world.

69. The Lily genus contains some of the most beautiful flowers. Linnæus calls them "the nobility of the vegetable kingdom."

70. The genus is distinguished as follows: *calyx* none, *corolla* inferior, six-petalled, campanulate; each petal having a line from the middle to the base; valves of the *capsule* connected by a mesh of hairs.

71. The White Lily rises to the height of three feet, flowers in June and July; leaves lanceolate, narrowed at the base and scattered along the stalk; corolla, campanulate and smooth inside.

ORDER 2.—DIGYNIA. Two Pistils.

72. This is a small order, but it contains the Rice plant, a species of great importance to the wants of man. This is an annual plant, growing from three to six feet high, with a simple, erect, round, jointed stem. The flowers are in a large terminal panicle.

73. Rice is cultivated in great abundance in most parts of India, where it is the chief article of food for the natives. In our Southern States,

69. What did Linnæus say of the lily tribe?—70. How is the lily genus distinguished?—71. Give a description of the white lily?—72. What important plant does the second order contain?—73. In what country do the inhabitants chiefly live on rice?

especially in the Carolinas, large quantities are also raised.

CLASS VII.—HEPTANDRIA. *Seven Stamens.*

Fig. G.



74. The name of this class comes from *hepta*, seven, and *aner*, a stamen.

This is a small class, and contains few plants of importance. The Horse-chestnut is among the best known.

ORDER 1.—MONOGYNIA. *One Pistil.*

75. The genus *Esculus*, contains several species, one of which is the well known Horse-chestnut. This tree came originally from the northern part of Asia, but is now common in most parts of the world.

The *calyx* of this plant is one-leaved ; *corolla* four or five petaled inserted in the calyx ; capsules large, and the seeds Chestnut-like.

The *leaves* are digitate, and seven parted. Few trees are more magnificent and beautiful than this when in flower.

74. What does the name of the seventh class signify ?—75. What ornamental plant belongs to this class ?

CLASS VIII.—OCTANDRIA. *Eight Stamens.*

Fig. H.



76. The name of this class signifies eight stamens.

77. This class, though not extensive, contains a number of genera of some notoriety, either as producing food or ornamental flowers.

ORDER 1.—MONOGYNIA. One Pistil.

78. The Nasturtion, a well known climbing plant, the fruit of which is pickled, and eaten, belongs here. In the evening, the flowers of this plant have been observed to emit spontaneously, at intervals, sparks of light, like the faint flashes of an electrical machine.

79. The Heath, (*Erica*), a most numerous genus, is a member of this order. *Loudon's Encyclopedia of Plants*, contains a description of nearly 400 species of this plant.

80. A few species of Heath are natives of Europe, but all the cultivated kinds came originally from the Cape of Good Hope. Not one of the Heaths has been found in America.

76. What does the name of the eighth class signify?—77. What is said of the extent and importance of this class?—78. What peculiarity in the nasturtion is noticed?—79. How numerous are the species of heath?—80. Where are the heaths from?

Fig. 149.



81. All the species are evergreen shrubs, from one to two feet high. Most of them are thickly branched, and closely beset with fine leaves. The flowers are very numerous, and in the majority, either red or white, but sometimes pink or purple. The sepals are four; the corolla four-cleft, bell-shaped, and hangs pendulous like that of the Whortleberry, as represented by Fig. 149, which is the species *physodes*.

These plants are great favorites as house-plants, because they are of easy culture, produce a profusion of flowers, and many of them flower in winter.

CLASS IX.—ENNEANDRIA. *Nine Stamens*.

Fig. I.



82. The name of this class comes from the Greek *annea*, nine, and *aner*, a *stamen*.

83. This is the smallest class in the system, there being only a few plants which have exact-

81. What description can you give of the heaths?—82. What does Enneandria mean?—83. What is said of the extent of this class?

ly nine stamens. Rhubarb, Cinnamon-tree, and Cashew-nut, are the most important genera of this class.

ORDER 1.—MONOGYNIA. One Pistil.

84. The genus *Laurus* contains the Cinnamon tree, the Sassafras and the Camphor tree, all of them well known for their aromatic qualities.

Fig. 151.



85. The Cinnamon tree, of which Fig. 151 represents a branch, is a native of the East, growing abundantly on the islands of Ceylon and Sumatra. It commonly rises to the height of about 20 feet, and bears fruit of a blue color, about the size of filberts, and of an insipid taste. The flowers are small, and the leaves ovate, lanceolate, and beautifully reticulated. It is the inner bark

of this tree which forms that well known spice called Cinnamon.

86. The Camphor tree is an evergreen, resembling in appearance the Cinnamon, and growing in the same countries. The wood, roots, leaves and bark of this tree, when rubbed or heated, emit a strong odor of camphor.

84. What important aromatics belong to order first of class IX. ?—85. Where does the cinnamon tree grow ?—86. What is the native country of the camphor tree ?

87. The Camphor is obtained by distilling the different parts of the tree, cut small, and suspended in a net, over a vessel of boiling water. In the head of the still through which the steam passes, there is placed some straw, on which the camphor is deposited as it rises along with the steam.

ORDER 3.—TRIGYNIA. Two Pistils.

88. The only genus belonging here is Rhu-barb, one species of which is cultivated in our gardens for the purpose of making pies and tarts. The part used for this purpose is the foot-stalk of the leaf.

CLASS X.—DECANDRIA. *Ten Stamens.*

Fig. K.



89. The name of this class comes from *deka*, ten, and *aner*, a stamen.

90. The stamens in this class are ten in number, and distinct, that is, not united in any part of their length. In the class Diadelphia, the stamens are also ten in number, but are united

87. What is the mode of obtaining camphor?—88. What is the only plant belonging to the third order of this class?—89. How is the name of the tenth class derived?—90. How are the flowers of this class distinguished from the class Diadelphia?

into two distinct sets, or parcels. By this difference, the two classes are distinguished, in addition to which, Diadelphous plants have a butterfly-shaped corolla.

91. This class embraces many useful, and a considerable number of highly beautiful plants. Among the former are Logwood, Mahogany, and the bitter drug Quassia, and among the latter we find the Pink, Laurel, Rosebay, Hydrangea, and Venus' Fly-trap.

ORDER 1.—MONOGYNIA. One Pistil.

Fig. 153.



92. Mahogany tree. This genus is called *Swietenia*, in honor of Dr. Von Swieten, a German. The tree is of the first magnitude, growing from the height of 80 to 100 feet.

The leaves are pinnate, growing in four pairs as shown by Fig. 153; leaflets oblong, ovate and lanceolate; flowers in a panicle; calyx five-cleft; petals five; flowers red.

92. It is a native of the hottest parts of America, and therefore was unknown before the discovery of Columbus.

94. Venus' Fly-trap, is a curiosity on ac-

91. What useful and ornamental plants does this class embrace?—92. What description can you give of the mahogany tree?—93. What is the native country of this tree?—94. Why is Venus' fly-trap a curiosity?

count of its having leaves, which catch and retain flies and other insects, when they happen to walk across them.

Fig. 154.



95. This plant consists of several radical leaves, in the midst of which, there rises a single scape as shown by Fig. 154. The leaves have winged petioles, the proper leaf being nearly in the form of two oblong circles with their edges joined. This is the part, which when open, as seen by the lower leaves of the figure, forms the trap. When the line between the two halves of the leaf is irritated, or touched ever so lightly, the two oval parts instantly begin to move towards each other, and thus fold themselves together as represented by the three upper leaves. Thus when an insect crawls along this part of the leaf, unless it immediately escapes, it is caught and retained.

ORDER 2.—DIGYNIA. Two Pistils.

96. The Hydrangea, a well known and favorite flower, belongs here. The species most esteemed is an under shrub, producing a profusion of pink flowers. This is from China. But there are several species which are natives of our southern states.

95. What description can you give of Venus' fly-trap?—96. What favorite flowers belong to the second order?

97. The Pink, (*Dianthus*), is also a member of this order.

98. The Carnation is the most beautiful of the species. The varieties of this, consisting of different colorings, amount to several hundreds. This is a favorite flower all over the world.

ORDER 5.—DECAGYNIA. Ten Pistils.

99. The name of this order comes from *deka*, ten, and *gyne*, a pistil.

100. The Scoke or Poke, belongs here. It is the *Phytolacca decandria*, of botanists, and is a common plant by the sides of fences, and along road-sides in New England. It grows eight or ten feet high, has red stems, and large ovate leaves. The flowers are white racemes, which are succeeded by red flat berries, containing a juice that stains a deep red.

CLASS XI.—DODECANDRIA. Twelve Stamens.

Fig. L.



101. The name comes from *dodeka*, twelve, and *aner*, a stamen.

102. But it will be found that many plants, which agree with the general description of this class, have from twelve to nineteen sta-

97. What is the botanical name of the pink?—98. What is the most beautiful of this species?—99. What is the derivation of Decagynia?—100. What is the *phytolacca decandria*?—101. Whence comes the name of the eleventh class?

mens. The stamens of this class are all separate and distinct.

103. This class is of small extent and contains but few plants of much interest.

ORDER 3.—TRIGYNIA. Three Pistils.

104. This is the place of the well known odoriferous plant called Mignonette. Its botanical name is *Reseda*, from the Latin *resedo*, to calm, or appease, because it was used as a remedy to the pain of bruises. In London, this is said to be the most fashionable of odoriferous plants, and therefore forms a very extensive article of culture among florists and market gardeners in the vicinity of that city.

Fig. 156.



105. The genus *Euphorbia*, the common name of which is *Spurge*, has a place here. This is a vast tribe of plants, some of which are exceedingly odd and grotesque in their appearance. Some of them creep, while others stand upright, and appear like stumps, without leaves or branches, as in Fig. 156.

This plant yields a milky juice which was formerly used in medicine.

106. The well known emetic *Ipecac* is a member of this family. It is the pulverized root of *Euphorbia ipecacuanhea*.

102. How many stamens may the plants of this class have?
 103. Is this class extensive or not?—104. What well known odoriferous plant belongs to third order of this class?—105. What is said of the genus *euphorbia*?—106. What emetic belongs to the *euphorbia* family?

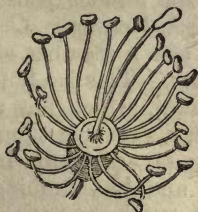
ORDER 6.—DODECAGYNIA. Twelve Pistils.

107. The name of this order comes from *dodeka*, twelve, and *gyne*, pistil, and therefore signifies twelve pistils.

108. This is the place of *Houseleek*. Its botanical name is *Sempervivum*, which signifies *live forever*, in allusion to the tenacity of life common to this genus. The whole tribe are evergreen plants of various sizes, generally only a few inches high, though some of them rise to the height of several feet. They all have thick, juicy leaves, like the common Houseleek, which almost every one has seen growing without roots, as when a branch is suspended by a string.

CLASS XII.—ICOSANDRIA. *Many Stamens*.

Fig. M.



109. The name of this class comes from *eikosi*, twenty, and *aner*, a stamen.

110. This class includes all such plants as have twenty or more distinct stamens, which are inserted into the calyx. The calyx is always monosepalous; that is, the sepals are united at the base.

107. What is the derivation of the name of the sixth order?
 108. What common plant belongs to this order?—109. What is the meaning of Icosandria?—110. How many stamens has this class, and to what part of the flower are they attached?

111. This is not a large class, but it contains the most important and delicious of esculent fruits,—the Apple, Peach, Pear, Prune, and Plumb. It also contains the Rose, than which no flower bears a higher rank in the estimation of the world.

ORDER 1.—MONOGYNIA. One Pistil.

112. The *Prickly Pear*, or Cactus tribe, also called *Indian Fig*, is a well marked and singular genus. The only species growing wild in the Northern States, is the *cactus opuntia*, which is common along the Hudson River. This is the well-known prickly species often seen in gardens.

113. One species is called the *Cochineal Fig*, because the little insect called Cochineal, (which makes the most beautiful as well as durable of all purple dyes,) feeds upon it.

Fig. 158.



114. the famous plant, the *Night-blooming Cereus*, is also a member of this genus. This is a hot-house plant, which has a triangular, creeping stem, growing several yards in length, and has nothing about it worthy of notice.

-
111. What important fruits does this class contain?—
 112. What species of cactus grows in the Northern States?
 113. Why is one species of the cactus tribe called the cochineal fig?—114. What is said of the night-blooming cereus?

But the flower is one of the most magnificent which the vegetable world produces. Its form is shown by Fig. 158, but not its beauty or size. Its calyx, when open, is nearly a foot in diameter, and its sepals being of a deep yellow on the inside, resemble so many rays of a star. The petals, which are not so long as the sepals, are of a pure white, while the great number of stamens with which the pistils are surrounded, add greatly to the appearance of the whole.

115. This flower expands only in the evening, and, before the next morning, is so withered, as to have lost most of its beauty.

Fig. 159.



116. The *Clove tree* is an important plant in this Order. The name *clove*, signifies *nail*, in allusion to the form of the fruit. This tree is a native of the East, and probably of Arabia, where it appears to have been known in very ancient times. It

grows to the height of about twenty feet, and bears on the ends of its branches, white, funnel-shaped flowers, which produce two-celled capsules, containing the well-known hot spice, bearing the name of the tree. Fig. 159 represents a branch in flower.

115. When does this flower expand?—116. Give some account of the clove tree.

117. In this order belong the Peach, Plum, and Cherry.

ORDER 2.—DI-PENTAGYNIA. Pistils from two to five.

118. The compound name of this order means *two-five pistils*.

119. Any flower having twenty or more stamens growing in the calyx, and from two to five pistils, belongs here.

120. The genus *Pyrus*, which includes the Apple and Pear, and which produces such a vast variety of different fruits, is a member of this order. The flowers have the calyx five-cleft, superior; corolla five-petalled; stamens many; pistils five; some five-celled and many-seeded.

121. The pupil ought to compare these common flowers with this description, and thus he will have an opportunity of observing when the stamens are attached to the calyx, when the calyx is superior, when it is five-cleft, &c.

ORDER 4.—POLYGYNIA. Many Pistils.

122. The name of this order comes from *polys*, many, and *gyne*, pistil, and therefore signifies many pistils.

117. What common fruits belong here?—118. What is the meaning of Di-pentagynia?—119. What are the characters of flowers belonging to this order?—120. What are the characteristics of the genus *Pyrus*?—121. What is said about comparing these common flowers with their descriptions?—122. What does Polygynia signify?

123. Flowers having more than twenty stamens inserted into the calyx, and within them five pistils, belong here.

124. The Rose is the best known and most highly esteemed genus of this order. The varieties of this flower are innumerable. Even the highly valued sorts, probably amount to a thousand or more. A single dealer in this article, in France, advertises 900 varieties of Roses.

125. The Rose is a perennial shrub, generally from one to four feet high; a few species assume the elevation of small trees. Lady Banks' Rose is twenty feet high, and the Persian Rose sometimes reaches the height of thirty feet or more.

CLASS XIII.—POLYANDRIA. *Many Stamens inserted on the receptacle.*

Fig. N.



126. The name signifies *many stamens*, which instead of being inserted into the calyx, as in Icosandria, grow on the receptacle, or end of the stem, and under the germen.

123. What are the characters of flowers belonging to Icosandria Polygynia?—124. What is said of the varieties of the rose?—125. How high do some rose-trees grow?—126. In the class Polyandria what is the number of stamens, and where are they inserted?—127. What two plants will show the difference between Icosandria and Polyandria?

127. The two figures illustrating the two Classes, will give some idea of the difference, but it can be much better seen by comparing the flower of the Apple with that of the Poppy.

128. It is a circumstance worth remembering, that plants with their stamens growing on the receptacle, are often poisonous, while those with their stamens inserted into the calyx are nearly always wholesome. As examples, the Apple and Peach are Icosandrous, while the Poppy and Bloodroot are Polyandrous plants.

129. Some of the noblest trees of the forest, as the Magnolia and Tulip tree, are members of this class. There also belong here many annuals of importance or beauty, among which is the Caper tree, the Poppy, from which opium is obtained, the Side-saddle flower, the Water Lily, Crow-foot, &c.

(It will be unnecessary hereafter to mention the names of the orders where they occur in regular succession, and where they merely signify one, two, or three pistils. If the student is ever at a loss for the names of the orders, he can instantly be informed, by turning to the table, p. 102, where, as well as the classes, they are all arranged, named, and illustrated.)

ORDER 1.

130. The Caper tree, Poppy, and Side-saddle flower, are members of this order.

128. How may we sometimes judge whether the plant be poisonous or not, by the insertion of the stamens?—129. What noble and important plants belong to this class?—130. What plants are examples of the first order?

131. The latter plant is called *Sarracenia*, in honor of Dr. Sarrazin, of Quebec, who first sent it from America to Europe. It is known to people in the country by the name of *Whip-po-will-shoe*. The species are curious on account of their leaves being cups which catch the rain as it falls. One species, the *purple*, is common in our bogs and meadows. This has a beautiful flower, and is easily cultivated.

132. This is the place of the Water Lily, one of the most fragrant and beautiful of aquatics.

133. It grows near the shores of clear ponds, and hence is often called *Pond Lily*. The leaves which float on the surface of the water, are large, orbicular, and cordate; sepals four, green on the outside, and white within. The flowers expand in the morning, and close in the afternoon. They are universal favorites on account of their beauty and delightful odor.

ORDER 5.—PENTAGYNIA.

134. This order, as already explained, has from two to five stamens. Examples of this order are Larkspur, Columbine, and Wolf's-bane.

ORDER 6.—POLYGYNIA. Many Pistils.

135. The Tulip tree, often called *White-wood*,

131. What is said of the *sarracenia*?—132. What is the most beautiful of aquatic plants?—133. Describe the water lily?—134. What plants are examples of the second order?—135. What are examples of the third order, and what is said of the tulip tree and the magnolia?

is among the tallest, straightest, and most beautiful of American forest trees. The flowers are produced at the ends of the branches, and resemble the Tulip in form and beauty. The Magnolia, a magnificent genus, the Crow-foot, or Butter-cup, the Anemone, and the Virgin's Bower, or Clematis, (the three latter very common plants,) are each worthy of particular notice.

Fig. 161.



136. The Custard Apple is found in warm climates only. The genus consists of several species of trees, some of which produce berries of the size of an orange. The species represented by Fig. 161, grows in South America, and is highly esteemed by the natives as a delicious fruit for the table.

CLASS XIV.—DIDYNAMIA. *Four Stamens, two long and two short.*

Fig. O.



137. The name of this class comes from *dis*, twice, *duo*, two, and *nema*, a filament, and is understood to mean that the flowers have four stamens, two of which are longer than the others, as shewn by Fig. O.

138. This class is divided into two orders, called *Gymnospermia*, and *Angiospermia*.

ORDER 1.—GYMNOSPERMIA. Seeds four, naked.

139. The name of this order comes from *gymnos*, naked, and *sperma*, a seed, and therefore means that the plants of this order have naked seeds.

140. The order embraces a large number of labiate plants in common use, as aromatics or kitchen condiments. Among them are Mint, Marjoram, Thyme, Balm, Hyssop, Betony, Summer Savory, Catmint, Lavender, Horehound, Motherwort and Calamint.

141. Catmint, (*Nepeta*,) has a Corolla with a long tube, and with the middle division of the under lip crenate, throat, having the margin reflected; calyx dry and striate; stamens approaching each other.

142. The name *Catmint* is derived from the fondness of cats for this plant, especially when it is withered. Hence it is said that these animals will destroy such plants as have been recently transplanted, but will not touch those which are growing vigorously.

136. What is said of the custard apple?—137. Whence comes the name of the 14th class, and how will you know that a plant belongs here?—138. What are the names of the orders of this class?—139. How is *Gymnospermia* derived, and what is the meaning of this term?—140. What well known plants does this order embrace?—141. Describe the flower of catmint?—142. From what circumstance does catmint take its name?

On this circumstance is founded the old saying with respect to Catmint.

“ If you set it,
The cats will eat it;
If you sow it,
The cats won't know it.”

ORDER 2.—ANGIOSPERMIA. Seeds many, enclosed.

143. The name of this order comes from *aggeion*, a vessel, and *sperma*, seed, and signifies that the seeds of this order are in a vessel, or pericarp.

The plants of this order are much less common and useful than those of the last.

144. Examples are the Trumpet flower, *Bignonia*, a climbing plant, with pinnate leaves. It is a native of the Southern States, but is a common ornament in New England, where it is seen adhering to the sides of houses, and climbing to their roofs. The flowers are in panicles, corolla trumpet-shaped, long, and deep red.

Foxglove, Figwort, Chelone, Gerardia, and Monkey flower, are also common examples.

143. What are the characters of flowers of the Angiospermia order?—What plants are examples of this order?

CLASS XV.—TETRADYNAMIA. *Stamens six; four long, and two short.*

Fig. P.



145. The name of this class is from *tetra*, four, *dys*, two, and *nema*, a filament, and in its present application, means that this class has six stamens, two of which are shorter than the others; as shown in Fig. P.

146. This class consists chiefly of *cruciform* plants, or those having four petals, which stand in the form of a cross.

147. Among the most common plants of this class, are Cabbage, Mustard, Satin flower, Radish, Peppergrass, and Water-cress.

CLASS XVI.—MONADELPHIA.

Fig. Q.



148. This name is derived from *monos*, one, and *adelphos*, brother, and therefore strictly means *one brotherhood*.

149. The name alludes to the circumstance, that the filaments of the flowers belonging here,

145. What peculiarities have plants of the class Tetradynamia?—146. What kind of plants chiefly form this class?—147. What are common cruciform plants?—148. How is the name of the 16th class derived?—149. What is the characteristic distinction of this class?

are united together, either partially, or throughout their whole length. This is the characteristic distinction of the class. The anthers are separate, and the filaments may also be separate, except at their bases.

150. The orders of this class depend on the number of stamens, and not on that of the pistils, as in the other classes. Hence the names of the orders are those of the former classes.

151. This class contains many plants which are universally known and highly esteemed, as the Geranium and Japan Rose. It also contains two, of more importance to the world than almost any others, namely, the Tea plant, and Cotton plant. The Tamarind, the Passion flower, and the Tiger flower, are also among the important, or beautiful of this class.

ORDER 1.—TRIANDRIA. Three Stamens.

152. The Tiger flower is so named from the spots on its petals. This beauty has a two-leaved spathe, no calyx, six petals, the two outer ones larger than the others, the filaments being united into a long tube. It is a native of Mexico.

150. On what do the orders of Monadelphina depend?—151. What are some of the important or beautiful plants of this class?—152. What is said of the tiger flower?

ORDER 2.—PENTANDRIA. Five Stamens.

Fig. 165.



153. The Passion flower, Fig. 165, is so called because the anthers are fixed to their filaments in such a manner as to represent a cross, the emblem of Christ's passion. This is a beautiful genus, containing nearly fifty species, all of them natives of hot climates. Many of them are climbing vines, but some are low herbaceous plants, and others have woody stems. The figure shews the common kind, the flower being blue and white; calyx colored, and five-parted; petals five; leaves palmated, and five-parted. It is cultivated in hot-houses, and climbs ten or twelve feet high.

ORDER 3.—HEPTANDRIA. Seven Stamens.

154. The Stork's bill, (*Pelargonium*), is so named because the beak of the fruit resembles the bill of the stork.

155. The genus now called *Pelargonium*, formerly made a part of the Crane's bill, (*Geranium*), genus, and many of the plants now popularly known as Geraniums, are really *Pelargoniums*. The small genus *Erodium*, *Heron's bill*, has also been removed from among the Geraniums.

153. To what class and order does the passion flower belong?—154. Whence does the stork's bill derive its name?

156. The *Erodiums* have no great beauty, and hence few of them are cultivated. The *Geraniums* present a few beautiful species which are in request as ornamental flowers. But it is the *Pelargonium* genus which are in such universal demand as household plants.

157. This genus came almost entirely from Africa, especially in the vicinity of the Cape of Good Hope, where they grow wild.

ORDER 5.—DECANDRIA. Ten Stamens.

158. The Spotted Cranes' bill, (*Geranium maculatum*,) is a pretty plant, growing abundantly in our woods. It has a purple flower with five petals; calyx five-leaved; leaves from three to five-parted, and cut lobed; they are all radical, and on long foot stalks.

ORDER V.—POLYANDRIA. Many Stamens.

159. This is the place of the Mallow, (*Malva*,) and the Hibiscus, both of them extensive genera of plants. One species of Mallow, called the *American*, is common about gardens, and is well known to children on account of its fruit, which is wheel-shaped, and is gathered and eaten, under the name of *cheeses*.

160. The genus *Camellia*, includes the Japan Rose, and the Tea plant.

155. What are the names of the two genera which have been separated from the geraniums?—156. Which genus is most cultivated as ornamental flowers?—157. From what country have the pelargoniums been derived?—158. What species of geranium grow in our woods?—159. What is said of the mallow and hibiscus?—160. What does the genus *camellia* include?

161. The generic description of the *Camellia* genus, is as follows: calyx imbricated, many-leaved, the inner leaflets largest. The Japan Rose is characterized by having its leaves ovate acuminate, acutely serrate, flowers terminal, sub-solitary. This plant came originally from the East, and is one of the most beautiful evergreen, flowering shrubs which the vegetable kingdom offers.

162. There are two plants, of different species, from which the leaves forming tea, are taken. From one comes the bohea, or black tea, and from the other the different kinds of green tea. They are both evergreen shrubs, about four or five feet high, and are natives of China.

163. Every leaf is gathered singly by hand, and the different qualities, prices and names, depend on the time of gathering. The first picking, when the leaves are small, form the kinds known by merchants under the name of Imperial teas, the second picking, when the leaves are larger, form the different sorts of Green tea.

The curled, or twisted appearance of all the finer kinds of tea, is given to each leaf by the hands of workmen, the leaves being heated for this purpose on a plate of iron. This being

161. What description is given of the *camellia*?—162. Does black and green tea come from the same plant or not?—163. What is said of gathering and preparing tea?

done while they are green, the form which we see is retained when the tea is dried.

CLASS XVII.—DIADELPHIA. *Stamens united into two parcels.*

Fig. R.



164. The name of this class comes from *dis*, twice, and *adelphos*, a brother, and is commonly called two brotherhoods, in allusion to the union of the stamens, or their filaments into two parcels, or sets.

165. In order to refer a plant to this class, it must be ascertained that the filaments are in two distinct sets, but it is not essential with respect to numbers how the division is made. In some examples the stamens are equally divided, while in others there is only a single one in one set, and a dozen in the other. In the Pea there are ten stamens, nine of which are in one parcel, and one in the other.

The flowers of this class are nearly all papilionaceous, or butterfly-shaped.

166. This class embraces a large number of plants of much importance to man as articles of food, as all the varieties of Beans, Peas, Lentils, and Vetches.

164. What is the derivation of Diadelphia?—165. How are flowers of the Diadelphous Class characterized?—166. What important vegetables belong to this class?—167. How are the orders of this class distinguished?

167. The orders are distinguished by the number of stamens, as in the last class.

168. A great proportion of the whole class have ten stamens, and therefore fall under the order Decandria.

The two first orders contain no plants of importance or interest to the pupil.

ORDER 3.—DECANDRIA. Ten Stamens.

All the varieties of Peas and Beans have their station here.

169. The Pea is the most valuable of legumes, and has been in use for the table from time immemorial. It has ten stamens, one of which is separate from the others; style triangular, keeled above, and downy; the two upper segments of the calyx shorter than the rest. The common Pea has round petioles, stipules rounded below, and crenate; peduncles many-flowered.

170. (These descriptions of common plants are added for the purpose of giving the young pupil an opportunity of comparing specimens with them, and thus of obtaining a practical knowledge of their different parts.)

168. What order contains most of the plants of this Class?—
169. How is the pea distinguished?—170. What is the design of describing common plants in this book?

Fig. 176.



171. The Moving-plant, (*Hedysarum gyrans*,) Fig. 176, is a curiosity in the respect from which it derives its name. Its leaves move backwards and forwards, without any external cause. It is a native of Bengal, but has been cultivated in all parts of the world as a vegetable wonder. Linnæus raised some of these plants from the seeds, and says, that no sooner had they acquired their ternate leaves, than they began to be in motion, this way and that; nor did this motion cease while they were growing. Sometimes many or most of the leaves would be moving at the same time, and then again only a leaflet or two would stir, and these perhaps on different parts of the plant.

172. No external causes, as light, darkness, heat, cold, or touching, would either excite their motions or prevent them.

173. Trefoil, (*Clover*.) The botanical name is *Trifolium*, and is derived from the Latin *tres*, three, and *folium*, a leaf, because these plants have three leaves. The common Red Clover is an example. Each head is made up of many funnel-shaped corollas, within each of which

171. What is said of the moving plant?—172. Do its motions depend on any external causes?—173. What is said of trefoil?

will be found ten stamens, in two parcels. The minute legumes are included within the calyx belonging to each corolla.

CLASS XVIII.—POLYDELPHIA. *Stamens united into many parcels.*

174. The name is derived from *polys*, many, and *adelphos*, brother, and therefore signifies many brotherhoods. The last class is characterized by two brotherhoods, because the stamens in that, are united in two sets. In this class these parts are divided into several parcels.

175. This is one of the smallest classes in the system, but it consists almost entirely of either ornamental or useful plants.

ORDER POLYANDRIA. Many Stamens.

176. The plants best known in this class are those belonging to the *Citrus*, or Orange genus.

177. This genus has a calyx, five-parted, petals five; oblong; anthers twenty; the filaments variously divided; berry nine-celled.

178. The species and varieties of this genus are very numerous. A splendid book, confined to the descriptions of this genus, and published at Paris, describes 169 kinds, either species or

174. What are the distinctive characters of the class Polydelphia?—175. How extensive is this class?—176. What favorite fruits belong to the order Polyandria?—177. Describe the Orange genus.—178. Are there many species and varieties of this genus?

varieties. Of these, there are forty-two sorts of sweet Oranges; thirty-two sorts of bitter and sour Oranges; of Bergamots, five sorts; of Limes, eight sorts; of Shaddocks, six sorts; of Limes, twelve; Lemons, forty-six sorts; Citrons, seventeen sorts.

CLASS XIX.—SYNGENESIA. *Five Stamens.*
Anthers united by their edges.

179. This name is from the Greek, *syn*, together, and *genesis*, origin, and signifies that the anthers grow together in a single set, or tube.

180. In addition to the number and union of the stamens, this class is characterized by the *compound* nature of the flowers; that is, many small flowers, or, as they are termed, *florets*, are clustered together upon a common receptacle, forming heads, as in the Daisy, Dandelion, and Thistle.

The flowers in the Syngenesous tribe differ so much from those heretofore described, that it is necessary to explain some words used in describing them.

181. *Capitum*, or head, is a cluster of florets inserted on a common receptacle, as in the Dandelion and Thistle.

182. The *involucrum*, or calyx, in these flow-

179. What does Syngenesia signify?—180. How is the class Syngenesia distinguished?—181. What is a capitum?—182. What is the calyx of a compound flower?

ers, consists of the scales which cover the lower and external part of the head. In the Thistle, these scales are armed with prickles.

Fig. 168. 183. The *Receptacle* of a compound flower, is the dilated apex, or upper extremity of the flower-stalk, on which the florets are situated. This is often formed like a button, but is sometimes globular, or oblong. Fig. 168, represents the receptacle after most of the seeds have taken their flight, the dots



showing the places of their attachment. The Daisy, and Coltsfoot, are common examples.

184. The figure shows the receptacle of the Dandelion, the calyx of which is double, the outer one being withered and reflected.

185. In these flowers, each floret consists of a tube or corolla to which the stamens are attached, and a germen, which when ripe, forms the seed. The corolla is placed on the germen, and to the germen is attached the pistil, surrounded by the stamens.

186. The corolla is either funnel-shaped, with the upper part divided into five, or sometimes into four parts.

183. What is the receptacle of a compound flower?—
184. What receptacle is shown by Fig. 168?—185. What does each floret consist of?—186. What are the forms of the corolla?

Fig. 169. 187. In this case it is denominated a *tabular* corolla, or, it is split on one side, and spread open, when it is called *ligulate*. Fig. 169, the right-hand figure is the tabular, and the other, a ligulate corolla.



188. The stamens are attached to the inside of the corolla, just below the mouth or limb. Their *filaments* are usually, but not always, distinct, but their anthers adhere by their edges, and are furnished by little membranous appendages at the tip.

189. The *style* of the *pistil* is filiform, or thread-like, and at its summit is split into two straight, spreading parts, which are the *stigmas*. Or, the whole pistil consists of a single piece from the base to the summit, the summit itself being the stigma.

190. The ORDERS in this class depend on relations or circumstances entirely different from those on which the other classes are divided.

191. The florets of compound flowers are either, first, *perfect*, that is, having both stamens and pistils; or, second, *barren*, having stamens, but no pistils; third, *fertile*, having pistils, but no stamens; or, fourth, *neutral*, having neither stamens nor pistils. On the presence or absence of these parts in the florets, are founded the orders of this class.

187. When is the corolla tubular, and when ligulate?—188. Where are the stamens attached?—189. What is the form of the stigma in these florets?—190. On what do the orders depend?—191. When is a floret perfect, when barren, when fertile, when neutral?

ORDER 1.—SYNGENESIA *ÆQUALIS*.

192. *Æqualis*, signifies equal, in reference to the presence of both stamens and pistils in the plants of this order.

193. Examples are Lettuce, Dandelion, Thistle, Burdock, and Boneset.

ORDER 2.—SYNGENESIA *SUPERFLUA*.

194. In this order, the florets of the *disk*, or centre of the flower, are furnished with both stamens and pistils; those of the *margin*, or *ray*, with pistils only. The pistils of the ray would therefore seem to be superfluous, because those of the disk are perfect without them. Hence the name of the order *Superflua*, that is, superfluous.

195. Examples of this order are Wormwood, Starwort, (*Aster*,) Golden Rod, (*Solidago*,) and Dahlia.

196. The *Aster* is a very numerous genus, most of which are North American plants. They are from a few inches to ten feet high, and are everywhere to be seen in autumn, with flowers of various colors, as red, white, blue, and lilac.

ORDER 3.—SYNGENESIA *FRUSTRANEA*.

197. In this order, the florets of the *disk* have

192. Does order first contain stamens and pistils or not?—

193. What plants are examples of the first order?—194. Describe order second?—195. What are examples of order second?—196. What is said of the aster?

both stamens and pistils like those of the last ; but in that, the florets of the ray have pistils only, while in this, the florets of the ray have neither stamens nor pistils ; and hence the name *Frustranea*, which means vain, or ineffectual.

198. This order embraces many genera, which have conspicuous flowers, as the Sunflower, the Jerusalem Artichoke, Rudbeckia, and Coreopsis.

ORDER 4.—SYNGENESIA NECESSARIA.

199. In this order, the florets of the *disk* are furnished with stamens, but have no pistils ; while those of the *ray* have pistils, but no stamens. Hence the name *Necessaria*, because to perfect the seeds, both stamens and pistils are necessary.

200. Examples of this order are Marygold and Cotton-rose, (*Filago*.)

ORDER 5.—SYNGENESIA SEGREGATA.

201. In this order, the florets contain both pistils and stamens ; but in addition to the common calyx, each floret has a calyx or perianth of its own, which is not the case in any of the other orders. Hence the name *Segregata*, which means separated.

202. This is a small order, and contains few

197. Why is the third order called *Frustranea* ?—198. What are examples of order third ?—199. What are the characters of the flowers of the fourth order ?—200. What plants belong to the fourth order ?—201. What are the peculiarities of the fifth order ?—202. What plants are of this order ?

common plants. Elephant's Foot and Globe Thistle are examples.

CLASS XX.—GYNANDRIA.

Fig. T.



203. The name of this class is from *gyne*, pistils, and *aner*, stamens, and is so named in reference to these parts growing together.

204. In all the other classes, these parts are distinct; but in this, the stamens are placed on the pistil or on the germen. This is the peculiarity of the class.

205. Gynandrous plants are among the most interesting productions of the vegetable kingdom, whether we consider the vivacity of their colors, the singularity of their organization, or the grotesque appearance of their roots, or the delicious perfume of their flowers.

206. These plants are widely distributed, and in temperate countries are chiefly found in meadows and pastures among grass; but in tropical climates they often constitute the chief

203. Whence is the name of this class derived?—204. What is the peculiarity of the class Gynandria?—205. On what accounts are the plants of this class interesting?—206. Are Gynandrous plants widely disseminated, or not?

beauty of the forest, growing in the forked branches of trees, and being what botanists call *parasites*.

ORDER 1.—MONANDRIA.

207. This order is separated into several divisions, depending on the situation of the anthers, and the form of the pollen. Monandria contains most of the plants belonging to the class.

208. DIVISION 1.—*Anther, terminal, erect. Pollen, in grains, adhering by an elastic ring.*

209. Genus *Orchis*. Many species of this beautiful tribe grow in our meadows and low grounds. The *fimbriated*, or fringed *Orchis*, rises to the height of two feet; leaves broad, lanceolate; flowers in a spike, each with five spreading petals; color purple. It is a beautiful plant.

210. DIVISION 2.—*Anther parallel with the stigma. Pollen, powdery.*

211. Ladies' Tresses, (*Neottia*,) belongs here. One species is common in our woods, and is known by the name of *Rattle-snake Plantain*, probably from the singular appearance of the leaves, which lie on the ground, and are green, with white veins. The scape rises to the

207. What is said of the divisions of Monondria and the proportion of plants it contains?—208. What are the characters of division first?—209. What is said of the genus *Orchis*? 210. What are the characters of the second division?—211. What common plant belongs here?

height of a foot, and produces a spike of white flowers.

212. DIVISION 3.—*Anther terminal, persistent.*
Pollen, powdery.

Fig. 171.



213. The *Bulbous Arethusa* is a native of our meadows. Stem a foot high, and in small plants leafless; in larger ones a few lanceolate leaves on its upper part are common. Flower single, petals blue; style large, incurved, and supporting its anther near the end. It is a beautiful little flower, and will be known by the adjoining Fig. 171.

214. DIVISION 4.—*Anther terminal, moveable, and deciduous. Pollen, waxy.*

215. The *tuberous Calopogon* is found in our meadows, and rises to the height of a foot or more; root bulbous; stem erect, sheathed at the base, having a single grass-like leaf. Flowers purple, with five spreading petals; inflorescence, a spike. Style concave, and supporting a single terminal anther.

ORDER 2.—DIANDRIA. Two Stamens.

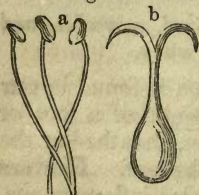
216. The Lady's Slipper, (*Cypripedium*.) is a well-known beauty of our woods. The leaves are two, springing from the root; large, oval,

212. What are the characters of the third division?—213. Describe the bulbous arethusa.—214. What are the characters of division fourth?—215. What is said of the tuberous calopogon?—216. Give a description of the ladies' slipper.

lanceolate; plaited, and downy. Flower commonly single, terminal and nodding. Petals four, spreading, the two lateral ones narrower, and somewhat twisted. Nectary a large purple, inflated bag, veined, villous, and longer than the petals. Style over the base of the nectary, supporting two lateral anthers on the inside, and ending in a broad, roundish, deflected, acute lobe, carinated on the inside. It flowers in May and June.

CLASS XXI.—MONŒCIA.

Fig. U.



217. The name of this class is derived from the Greek *monos*, one, and *oikos*, house, and therefore literally means one house.

218. This name is in allusion to the circumstance, that in this class the stamens and pistils are on the same tree; while in the next class, *Dicœcia*, these parts are situated on different trees.

219. In all the classes heretofore described, the stamens and pistils are in the same flower. In *Monœcia* these parts are in different flowers,

217. What is the derivation of *Monœcia*?—218. To what circumstance does this name allude?—219. How does this class differ from all those heretofore described?

though on the same plant. In the figure, *a* represents the stamens, and *b*, the pistils.

220. This class embraces most of the important forest and timber trees in temperate climates. The Oak, Birch, Pine, Beech, Walnut, and Chestnut, are members of this class.

The class has eight orders, but we shall give examples only of those which contain the most common plants.

221. The flowers containing the stamens are called *stameniferous*, and those with pistils, *pistiliferous* flowers.

222. The orders depend on the number of stamens which the stameniferous flowers contain.

ORDER 4.—TETRANDRIA. Four Stamens.

223. This order embraces the genus Alder, several species of which are common in moist woods.

Fig. 173.



224. The species *Alnus serrulata*, or saw-leaved Alder, is a well-known shrub growing in moist places, as along the sides of brooks, and rising to the height of fifteen or twenty feet. This plant buds in the fall, and flowers in March. It at first produces smooth, pretty-looking aments, hanging in clusters of

220. What plants does this class embrace?—221. By what names are the flowers containing the stamens and pistils distinguished?—222. On what do the orders of this class depend?

three or four. These are the stameniferous buds, which, as the time of flowering approaches, grow lax, and finally emit a yellow dust, which is the pollen. The fertile or pistiliferous aments are short and rigid, forming small cones, which remain on the tree during the winter. The two kinds are represented by Fig. 173, and are readily distinguished on the tree.

226. The Beech, Mulberry, common Nettle, and Box tree, belong here.

ORDER 6.—HEXANDRIA. Six Stamens.

Fig. 174.



226. This is the place of the *Cocus*, or Coconut tree, the fruit of which is a well-known delicacy from warm climates. The tree grows to the height of fifty or sixty feet, and has neither branch nor leaf, except at the top, as shown by Fig. 174. The leaves are pinnated, and of great length, and the leaflets so large as to be

employed for covering the roofs of houses. When reduced to fibres, they are also employed to make mats and carpets.

223. What common plant does the fourth order contain?—

224. What description can you give of the common alder?

227. From the top of the tree, and in the midst of the whorl of leaves, there arises a shoot, Fig. 174, which bears the flowers and fruit. The fruit is a nut whose appearance is so universally known as to need no description. It has a cavity, which, when the fruit is young, contains about a pint of clear, pleasant-tasted liquor. But as the fruit grows old, this turns milky, and is gradually absorbed by the white pulp which contains it, until, finally, none remains.

228. The Oak, (*Quercus*), which embraces a large number of very important species, is a member of this order. In North America we have more than thirty species of this tree, forming, as a whole, the most useful of our forest trees, both for timber and fuel.

Fig. 175.



229. The Cork tree, (*Quercus suber*), Fig. 175, is a species of the Oak, and is cultivated in Spain, Portugal, and the South of France, for its bark, of which our bottle corks are made. The outer bark is employed for the purpose, there being an inner bark which protects the tree, and which in its turn becomes cork. The tree grows to the height of about thirty feet, and the bark is taken off

225. What other plants belong here?—226. To what class and order does cocoa-nut belong, and what is the form of the tree, and what are its uses?—227. What is said of the nut of this tree?—228. What is said of the oak species?—229. From what species of this tree is cork obtained?

once in about ten years. It is said, this treatment, so far from injuring these trees, increases their longevity.

230. The Beech tree, Walnut tree, Chestnut, Arrow-head, and Dragon-root, (*Arum*,) belong here.

ORDER 8.—MONADELPHIA. Stamens united into a single body.

231. *Cucumber*. The difference between the stameniferous and pistiliferous flowers, will readily be distinguished in this plant. The first are on long foot-stalks united into a cylinder, and appear before the pistils. The fertile flower is situated on the germen, and does not open until the young fruit is distinctly visible.

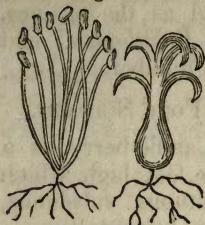
233. The genus *Pinus*, which contains a most important tribe of forest trees, belongs to this order. It embraces the different species of Pines, Firs, and Spruces, some of which are the tallest and most noble plants in the vegetable kingdom.

CLASS XXII.—DICECIA. *This class contains thirteen orders.*

234. The flowers containing the stamens are on one tree, and those containing the pistils on another.

230. What other trees belong to this order?—231. To what class and order does the cucumber belong?—233. Where do the pine trees belong?—234. What are the characters of plants belonging to class Dicecia?

Fig. V.



235. The name of this class signifies *two houses*, being derived from *dis*, twice, and *oikos*, a house, in reference to the stamens and pistils being situated in different plants.

236. The difference between the staminate and pistillate flowers will not at first be obvious to the learner. But by comparing the aments from different trees, the pupil will soon be able to tell which will bear fruit, and which not.

237. In this class the orders are distinguished by the number and situation of the stamens. We shall illustrate such of the orders only, as contain common or important plants.

ORDER 2.—DIANDRIA. Two Stamens.

238. The Willow, (*Salix*), is a very large, and widely diffused genus. The different species grow in nearly every climate on earth, being found from frozen Lapland, to the tropical climates of the Levant, and the East Indies.

239. About thirty-five species of Willow are natives of North America, besides which we

235. What does the name of this class signify?—236. How will you find the difference between staminate and pistillate trees?—237. How are the orders of Diœcia distinguished?—238. To what class and order does the willow belong?—239. How many species of willow have we in this country?

have several exotics of this tribe, which are nearly as widely disseminated as the natives. The Weeping Willow, (*Salix Babylonica*,) and the Yellow Willow are of this number.

ORDER 4.—TETRANDRIA. Four Stamens.

240. The Bay-berry, or Candle-berry, is a shrub, growing three or four feet high, which produces the greenish unctuous substance, known under the name of *Bay-berry tallow*.

It is chiefly found on the sea, extending a few miles from the shore. This shrub produces abundance of hard berries, on the outside of which the tallow is contained. It is separated by throwing the berries into boiling water, when the tallow is melted, and rises to the surface.

241. The Fifth *Order*, PENTANDRIA, contains the Hop, the Pepperidge, or Tupelo tree, and the Prickly Ash.

242. The Seventh *Order*, PENTANDRIA, contains the Poplar genus, of which we have ten native species. The Balsam Poplar, from the buds of which the Canada Balsam is obtained, is one of these.

243. The Lombardy poplar is a native of Italy, and like all other trees of rapid growth, is in proportion short-lived. This tree, former-

240. From what kind of a plant is the bay-berry tallow obtained?—241. What plants does the fifth order contain?—242. Where does the poplar belong?—243. What is said of the Lombardy poplar?

ly so fashionable as an ornament, as it remains now, shows not a single claim to the esteem in which it was formerly held, except its rapid growth.

ORDER 12.—MONADELPHIA. Stamens unite into one body.

Fig. 177.



244. Butcher's Broom, (*Ruscus*), is a genus of small evergreen shrubs which are curious on account of their bearing their flowers and fruit on their leaves, as shown by Fig. 177. The flower, however, does not properly grow out of the leaf, but on

a foot-stalk of its own which runs between the coats of the leaf, as may be seen by close examination. The pistillate flowers are succeeded by red berries, nearly of the size of cherries. In our green-houses this plant, though it flowers, will not produce fruit unless the staminate shrub be present also.

245. The Nutmeg tree grows to the height of thirty feet, and is cultivated in the East Indies for its fruit, which forms a spice univer-

244. What singular plant is described under the order Monadelphia?—245. What account is given of the nutmeg and mace?—246. How does Polygamia differ from the other classes?

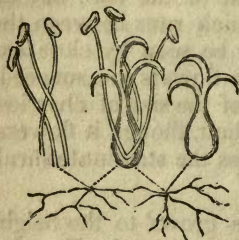
Fig. 178.



sally known. The entire fruit is nearly the size of a Peach, and has a bitter external covering. As this dries it bursts open and shows the next coat, which is the *mace* of commerce, Fig. 178. Within the mace is contained the kernel, of a dark brown color, which is the well known spice in question.

CLASS XXIII.—POLYGAMIA. *Flowers either staminate, pistillate, or perfect, upon the same, or on different plants.*

Fig. W.



246. This class differs from the two preceding ones, in having not only the stamens and pistils in different flowers upon the same individual, as in Monœcia, or upon separate individuals as in Dicœcia, but also, in having these two parts contained

in one flower, and mixed with those which are either staminate or pistillate.

ORDER 1.—MONŒCIA.

247. The Maples, of which there are many species in our forests, are of this order.

247. To what order do the maples belong?

248. The sap of the sugar maple, when evaporated by boiling, and purified, forms the well-known article, *maple sugar*, of which some of my young friends are very fond.

ORDER 2.—DICECIA.

249. The Ash, is a genus of which we have nine or ten species. The American, or *White Ash*, grows to the height of eighty or ninety feet, and for various useful purposes is preferred by mechanics to all other kinds of timber.

250. The Ficus, or Fig genus, embraces about fifty species, all of them natives of hot climates.

251. The flowering of these plants is quite peculiar. The green fruit is a hollow calyx, or receptacle, in which the flowers are contained.

Fig. 180.



252. In the common Fig, the stamens and pistils are on different plants, and the seeds could not therefore be perfected, were it not for the help of certain minute flies, which, in their search for honey, carry the pollen from the anthers of one flower to the stigmas of another. Fig. 180 represents the half of a Fig in its green state, showing the situation of the flowers on the inside.

253. The wonderful provision of these little insects, by whose means the fruit and seed of

248. What use is made of the sap of the sugar maple?—
 249. What is said of the American white ash?—250. How many species does the fig genus embrace?—251. What peculiarity is there in the flowering of the fig tree?—252. By what means are the seeds of the fig perfected?—253. How do these little insects display the care and beneficence of the Creator?

the Fig is perfected, displays at once the care and beneficence of the Creator; for, while on the one hand, it ensures the perpetuity of a fruit of great importance to man; on the other, it allows the pleasure of existence to a tribe of insects, which appear designed expressly for this purpose.

CLASS XXIV.—CRYPTOGAMIA.

254. In this class, the stamens and pistils are either concealed, imperfect, or wanting.

255. Cryptogamous plants differ essentially from any of those we have heretofore described. The number or situation of the stamens or pistils, (which have been our guide in the arrangement of the other classes,) are in this either concealed, or wanting. Nor do the productions included in this class afford flowers, properly so called; and hence they are termed *flowerless* plants, in order to distinguish them from the other classes.

Fig. X.



256. This class contains a vast number of vegetable productions commonly known under the names of Mosses, Mushrooms, or Toadstools, Ferns, Flags, and Lichens.

257. Each order is distinguished by its own peculiarities, having little, or sometimes nothing, in common with the others, except the want of flowers, by which the entire class is separated from all other vegetables.

ORDER 1.—FERNS.

258. In this order, the fruit, in most cases, is placed on the back of the leaf, or *Frond*, as the leaves of Cryptogamous plants are termed.

Sometimes the fruit appears only in little patches or dots on the back of the Frond; but sometimes the whole under surface is covered with a mass of minute seeds.

259. Many plants of this order are common in our woods and low grounds. Those best known are Polypody, Spleenwort, Brake, and Shield Fern.

260. The word *Polypody*, means *many feet*, in allusion to the great number of roots peculiar to these plants.

254. What is the grand distinction between the class Cryptogamia, and the other classes?—255. What general name is given to the plants of this class to distinguish them from others?—256. Under what names are the plants of this class known?—257. How are the orders distinguished?—258. Where is the fruit of the ferns placed?—259. Give examples of the fern tribe?—260. What does polypody mean?

Fig. 182.



261. Fig. 182, represents the common Polypody, which grows in abundance in our moist, rocky, uncultivated lands; leaves or fronds deeply pinnatifid, and about a foot long, stipe smooth, and grooved on the upper side; leaflets, or segments of the leaf, slightly

serrate. This plant is common to Europe and North America.

Adder's Tongue. The botanical name is *Ophioglossum*, from *ophis*, a serpent, and *glosse*, a tongue.

Fig. 183. 262. Common Adder's Tongue, Fig.



183, is a pretty little plant, only three inches high, consisting of an ovate, entire frond, from the base of which rises a stipe, which bears the fruit, in a kind of crowded spike. This plant differs from the ferns, in bearing its fruit on a spike, instead of on the backs of the fronds.

ORDER 2.—HORSETAILS.

263. This order includes only a single genus, the *Equisetum*, or Horsetail. There are many species of this genus, one of which is well known under the name of *Scouring Rush*, Fig. 184.

261. What plant does Fig. 182 represent?—262. What does Fig. 183 represent?—263. What plants are included under the second order?—264. What is said of the scouring rush?

Fig. 184.



264. The stem of this plant is without leaves, erect, straight, hollow, and furrowed, the ridges being cut into minute teeth. The joints of the stem are furnished with short sheaths, or rings, colored black and white. The fruit grows on a terminal spike or ament. This simple plant is in common use for scouring wood and polishing metals. The outer bark contains a quantity of flint, and hence will act upon the hardest steel. This plant is about two feet high, and about the thickness of a pipe stem.

ORDER 3.—CLUB-MOSSES.

Fig. 185.



265. This order consists chiefly of small moss-like plants, with creeping stems, and fine leaves, like scales. Many of them are ever-greens, and seem to thrive very well under the snow.

266. The genus called *Lycopodium*, or Wolf's foot, has several species which are common in our woods.

267. They are very neat, deep-green little plants, well known under the name of *ground pines*, as Christmas decorations.

268. The flat Club Moss, Fig. 185, creeps

under the leaves in the woods, now and then sending up an erect stem, which is forked, and terminated by a short yellowish spike, which bears the fruit. The leaves are two-rowed, short and acute, and are green through the year.

ORDER 4.—MOSSES.

269. The Mosses, properly so called, are dry herbs, furnished with distinct leaves and rising stems. They are found everywhere in damp woods, and among rocks, both exposed to the sun and in shady places.

Fig. 186.



270. They may often be known by their capsules, surmounted by lids, as represented by Fig. 186. These are elevated above the leaves or green beds of Moss, by their foot-stalks, and many of them have a nodding position as shown by the figure.

ORDER 5.—LIVERWORTS.

271. This order differs from the Flags, which comes next, in not growing in water, and from the Mosses just described, either in not having a lid, or if this be present, in its opening at the

265. What plants come under the third order?—266. Describe the lycopodium, or wolf's foot.—267. What are the mosses commonly called, and for what purpose are they used?—268. What plant does Fig. 186 represent?—269. What plants come under the fourth order?—270. How may these mosses be known?—271. How do the liverworts differ from the flags and the mosses?

top, and not bursting on the side as do those of the Mosses.

272. Many of these plants are so minute as to require the aid of a magnifying glass in order to distinguish their different parts. They are found on rocks, old walls, and the bark of trees.

Fig. 187. 273. The genus called *Jungermannia*, so named in honor of M. Jungermann, a German Botanist, contains a great number of curious little plants, one of which is represented by Fig. 187. The right-hand figure shows the whole plant of the natural size, that on the left being the same, magnified. It is found on the barks of trees, and on mossy rocks. It is half an inch high.



ORDER 6.—FLAGS.

274. In this order the seeds are contained in the substance of the frond, or in little enclosures variously situated. The plants of this order are nearly all aquatic, and are submerged, that is, they grow under water. The Sea-weeds of the ocean, many species of which are everywhere found cast upon the shores, are of this order.

275. One of the most common plants of this

272. Where do the liverworts chiefly grow?—273. What can you say of the genus called *Jungermannia*?—274. What plants come under the sixth order?—275. What is a common plant of this order found on the sea-shore?

Fig. 188. tribe, is the Knotty Fucus, Fig. 188, which grows in abundance on rocks and stones near the sea-shore. The Frond is leathery and compressed, but now and then contains a bubble of air, which being heated or pressed, bursts with a small explosion.



276. Many of the species of this order consist of flocculent, or scum-like substances, which we see on the sea-shore, and in the water of stagnant ditches. Some of these appearances which are commonly taken to be the result of fermentation, presenting to the eye nothing more than a mass of dead matter, are in reality masses of minute vegetables, beautifully formed, displaying as many wonders, and more peculiarities than the most beautiful plants of our gardens.

Fig. 189.



277. No one without minute inspection, would believe that the flocculent, stringy mass, Fig. 189, could contain any thing like vegetable organization, or beauty; and yet on examination with a lens it is found to be a regularly, and beautifully constructed vegetable, consisting of little pieces, or grains joined together, each having its fruit contained in a proper capsule, as represented by the left hand figure, which is one of

276. What is said of plants which appear like scum?

the fibres magnified. The genus to which this plant belongs is called *Ectocarpus*.

ORDER 7.—ROCK AND TREE MOSSES.

278. These Mosses are the Lichens of botanists, and are among the lowest grades of vegetation.

277. They are found on rocks, wooden fences, and the barks of trees.

280. To distinguish these productions from each other, and reduce them to a scientific arrangement, is a most laborious and difficult department of botany; and yet such has been the perseverance and patience of botanists, that more than a thousand species of this order have been minutely examined by different authors.

281. Several species of this order answer useful purposes. Such are the Iceland Moss, (on which live the rein-deer of arctic regions,) and the Cudbear, which is employed in dying purple.

Fig. 190.



282. As an example of this order, we give a figure (190) of one species of the genus *Calicium*, which term signifies a little cup, because the seed-vesels are in the form of minute cups, as the figure shows. The upper drawing shows this vege-

277. What is said of the plant represented by Fig. 189?—
 278. What plants come under the seventh order?—279. Where are these mosses found?—280. What is said of the difficulty of distinguishing and classing these productions?

table of the natural size, the lower one being magnified to show more distinctly the form of the cups.

283. It grows on decayed wood and rocks, and some of the species may be seen in almost any place which will admit of their growth.

ORDER 8.—MUSHROOMS.

284. This order consists of vegetable productions, in the form of thick, fleshy bodies, without herbage, properly so called.

285. They are known under the name of *Fungi*, by botanists, and *Toadstools*, by others. The seeds of this order are arranged in little tubes placed on the under side of the caps.

Fig. 191.



286. The *cap* of the Mushroom is the upper and expanded part, which is placed on the *stipe*, Fig. 191.

287. The *gills* consist of thin, radiating expansions on the under side of the cap. Among these the seeds are placed.

288. In the young state the cap is globular,

281. What useful mosses are mentioned?—282. What plant is described and figured as an example of this order?—283. Where does the calicium grow?—284. What are the mushrooms?—285. By what names are the mushrooms known?—286. What part of a mushroom is the cap?—287. What are the gills?—288. How does the cap differ in the young and old mushrooms?

and there is a thin membrane, or fringe, by which its margin is connected with the stipe, or stem, as shown by the left-hand figure. This is called the *curtain*; and as the cap grows larger, this bursts, or parts in the direction of the circumference of the cap, so as to expose the gills. As the plant grows old, this part becomes dry, and forms a ring around the stipe, as shown in the right-hand figure.

Growth of Mushrooms.

It is well known, that Mushrooms spring up almost everywhere, especially among decayed substances, and during the hottest season of the year. Moisture appears also to be necessary to their growth; and hence we see thousands during the warm season, after a shower, where none existed the day before. From these circumstances, persons who have not examined this subject, suppose that Toadstools grow without seeds, not being able to account for the presence of the seeds in such and such places—and if present, not seeing why they should not have grown before.

Now all this is readily accounted for, there being in truth no more reason to believe that Mushrooms grow without seeds, than there is to suppose that an Oak springs up without the planting of an acorn. The seeds of Mushrooms are so exceedingly small as not to be distinguished by the naked eye, or without the help of a magnifying glass. When the species commonly known under the name of *Puff-ball*

is disturbed, there rises from it a fine dust resembling smoke, which are its seeds; and it will be seen, that a slight wind will carry such light bodies to great distances; and their number is such, that a single plant would afford a quantity sufficient to cover a considerable space, and not leave a single inch without more or less seeds. Under such circumstances, it will be obvious also, that these seeds might gain admittance into concealed and covered places, as under old buildings, and into cellars, and indeed that they might be floated into almost any place where the atmosphere has admission.

With respect to their growth, it is well ascertained that no seeds will vegetate without the combined influence of heat and moisture, and that few will grow without the addition of light and air also. Rye, wheat, and other seeds, may be kept for an indefinite length of time in a dry place, and, even if exposed to heat and moisture, they will not grow if light and air be entirely excluded. Thus seeds covered at considerable depths in the ground, will remain dormant for years, and for aught we know, for centuries, and still retain their vitality, that is, they will grow, if placed in proper situations. This is proved by the fact that earth, deposited by the flowing of rivers, and which has lain for centuries ever so deep under the surface, will, if exposed to a proper situation, produce some kind of plants from the seeds it contained. From all this we learn that seeds will grow only when circumstances favor their vegetation.

Now in applying these facts and conditions to the growth of Mushrooms, we have only to consider that their seeds are almost everywhere, and that they spring up whenever the circumstances of heat and moisture are such as they require for their vegetation. This appears to be the whole secret with respect to the growth of this kind of vegetation.

Number of Mushroom species.

289. Concerning the whole number of species belonging to this order, not even a conjecture can be offered. The number described by Sprengel, who has spent much time, and written largely on the subject, is 2800. Besides these, other authors have described at least half as many more; so that the number of species arranged in botanical works amount to at least between 4000 and 5000. The Swedish botanist, Friers, discovered no less than 2000 species of this order, within the compass of a square furlong, in his own country. In North America, Professor Torrey thinks there are at least 3000 species of Fungi; and for aught that is actually known, they may amount to twice this number. And yet nearly all that have been described, belong to the northern and temperate regions, the tropical species being almost entirely unknown to authors. From all this there is reason to believe that the number of

289. What is said of the number of species belonging to the mushroom tribe?

species of this order which the earth produces, is almost innumerable.

Several species of this tribe are used for food in various parts of the world, but by far the greater number are poisonous; and some are such active poisons, as to destroy life in a short time when eaten. None are poisonous when merely handled.

PRACTICAL BOTANY.

Practical Botany is the application of the foregoing explanations to the different parts of plants, for the purpose of determining their Classes, Orders, Genera, and Species, and consequently their names. Directions have already been given in what manner the learner is to proceed for this purpose; and we here give descriptions, chiefly of the most common plants, that the pupil may have an opportunity of exercising the knowledge he has obtained, by determining their species and names.

Such classes and orders will be omitted as do not contain the most common plants.

CLASS II.—DIANDRIA. *Two Stamens.*

ORDER 1.—MONOGYNIA. *One Pistil.*

Flowers inferior, monopetalous, irregular; fruit in capsules.

Genus VERONICA. Calyx four-parted; corolla

What is practical botany?

four-cleft; rotate, the lower division narrow; capsule superior, two-celled obcordate.

Species *scutellata*. Marsh Speedwell. Racemes lateral, alternate; partial flower-stalks divaricated; leaves linear, slightly indented.

Found in moist places along the sides of brooks, and growing from a few inches to a foot or more high; stem weak; leaves opposite, linear-lanceolate, and slightly toothed; flowers small, of a pale flesh-color, with purplish stripes. Perennial, and flowers all summer.

Flowers inferior, monopetalous, irregular; seeds naked.

Genus COLLINSONIA. Corolla somewhat ringent; lower lip many-cleft, capillary; one-seeded.

Species *Canadensis*. Horseweed. Leaves heart-ovate; stem smooth; teeth of the calyx subulate, shorter than the corolla.

The plant is three or four feet high; stem furrowed, and slightly pubescent; leaves opposite, very large, serrate and acuminate, the lower ones on long petioles, the upper pair sessile. Panicle terminal, with opposite branches. Flowers dull yellow; stamens distant, and filaments long; stigma bifid. It grows in moist woods, and flowers in July and August. When handled, it has a fetid smell.

CLASS III.—TRIANDRIA. *Three Stamens.*ORDER 1.—MONOGYNIA. *One Pistil.**Flowers superior.*

Genus IRIS. Corolla six-parted, the divisions alternately reflected; stigma petaloid.

Species versicolor. Blue Flag. Flower-de-luce. Leaves ensiform; stem acute on the side; capsules oblong, three-sided, with obtuse angles.

The blue flowers of this plant are very conspicuous in our meadows and low grounds, in June. Stem from one to three feet high, round on one side, with an edge on the other; branched at the top, and bearing from two to six flowers; peduncles flattened on the inside. Germ three-cornered. Outer petals reflected, and beardless, the border purple, and the claw variegated with various colors. Inner petals erect, spatulate, or lanceolate, and paler than the outer. Style short and concealed; stigmas three, petaloid, resting on the outer petals, and more or less reflected. Stamens concealed under the stigmas. Seeds numerous. Perennial. The root is poisonous.

CLASS IV.—TETRANDRIA. *Four Stamens.*

ORDER 1.—MONOGYNIA.

Genus HOUSTONIA. Corolla monopetalous; calyx four-toothed; capsule two-celled, two-valved.

Species *cærulea*. Bluish *Houstonia*. Root-leaves ovate; stem compound; first peduncles two-flowered.

This pretty little plant is often seen in patches quite covering the ground. It begins to flower in May, and continues all summer. Flowers pale blue, and smaller than violets; stem slender, repeatedly forked, and three or four inches high. Corolla with a slender tube, with four ovate acute, spreading segments. Anthers inserted at the mouth of the tube. Stigma bifid. Perennial.

Genus *CORNUS*. Calyx four-toothed; corolla four-petalled, superior; drupe with a two-celled nut.

Species *Florida*. Dogwood tree. Abortive, flowers in heads, surrounded by an involucre of obovate leaves, with recurved points.

This is a very conspicuous tree, which flowers in May and June, while other forest trees are just putting forth their leaves. It has a profusion of white flowers, forming a striking contrast with its companions at that season of the year. The beauty of these flowers, and the show the tree makes, are entirely owing to the large white involucre with which the proper flowers are surrounded. Flower small; calyx superior, a little bell-shaped, and ending in four spreading teeth; corolla of four obtuse, reflected, yellowish petals. Stamens four, erect, with oblong anthers, in the middle of which the filament is inserted. Style erect, shorter than the

stamens; stigma obtuse. This tree grows to the height of twenty or thirty feet.

CLASS V.—PENTANDRIA. *Five Stamens.*

ORDER 1.—MONOGYNIA. One Pistil.

Genus VIOLA. Calyx five-leaved; corolla five-petalled, irregular, spurred; anthers cohering; capsule one-celled, three-valved.

Species cucullata. Common Blue Violet. Stemless; leaves heart-shaped, rolled at the base and serrate; petioles not margined; petals bent obliquely, the lateral ones bearded; all whitish at the base.

This is the common blue Violet, so abundant in our wet meadows and low grounds. Leaves cordate and serrate, or crenate; petioles longer than the leaves; scape four-angled; flowers large, bluish purple; the lateral petals bearded. From two to eight inches high. Flowers in May.

ORDER 2.—DIGYNIA. Two Pistils.

Genus ASCLEPIAS. Corollas monopetalous, reflected; nectaries five, ovate, concave, with a little horn projecting from each; follicles two.

Species Syriaca. Common Silk-weed, or Milk-weed. Stem simple; leaves lance-oblong, gradually acute, or acuminate, downy underneath; umbels nodding; follicles pointed.

Stem three or five feet high, and undivided; leaves large, petiolate and oblong; umbels com-

posed of many flowers, nodding. Calyx with lanceolate segments; corolla greenish and reflected. The nectaries form the chief part of the flower. These are reddish, truncated obliquely inwards, and divided into two parts, ending in two horns which are a little curved. The anthers are in a cylindrical mass. Follicles, or pods, oblong acute, and containing large quantities of silky down. When young, the shoots of this plant are sometimes eaten instead of Asparagus. Found in moist places, and flowers in July. Perennial.

ORDER 3.—TRIGYNIA. Three Pistils.

Genus SAMBUCUS. Calyx five-parted; superior; corolla five-cleft; berry three-seeded.

Species Canadensis. Common Elder. Cymes five-parted; leaves compound, in about four pairs; leaflets oblong-oval, and acuminate; stem shrubby, and containing a large pith.

This is the common Elder, which grows by the sides of roads, and shows a profusion of yellowish-white, sweet-scented flowers.

ORDER 5.—PENTAGYNIA. Five Pistils.

Genus DROSERA. Calyx five-parted; corolla five-petalled, inferior; capsule one-celled, three or four valved, opening at top; seeds many.

Species rotundifolia. Round leaved, sundew; leaves, radical, roundish, hairy; scape bearing a simple raceme.

This is a singular, but pretty little plant, well

known by the name of *Sun-dew*. It is so called because the leaves are always covered with a kind of jelly, which the sun never dries. Leaves small, nearly round, radical, and lying flat on the ground. Scape three or four inches high, bearing a little raceme of white flowers. It grows in moist places, and flowers in July. Perennial.

CLASS VI.—HEXANDRIA. *Six Stamens.*

ORDER 1.—MONOGYNIA. *One Pistil.*

Genus LILIUM. Calyx none; corolla inferior; six-petalled, the petals with a longitudinal groove from the middle to the base.

Species Canadensis. Common Yellow Lily. Leaves in remote whorls; flowers terminal, nodding; petals spreading or reflected. In the first part of summer, this is one of the beauties of our meadows. It grows higher than the grass, and therefore makes itself conspicuous at a considerable distance. Stem round, green, and from two to four feet high; leaves lanceolate, in whorls of about six; flowers, one, two, or three; bell-shaped, and pendulous, yellow, with black spots on the inside. Flowers in June and July. Perennial.

ORDER 3.—TRIGYNIA. *Three Pistils.*

Genus MEDEOLA. Calyx none; corolla inferior; six-parted, revolute; berry three-celled.

Species Virginica. Cucumber root. Leaves in whorls terminating with three; stem erect,

smooth, and covered with cotton—like down. Leaves in two whorls, the lower consisting of six or eight, the upper, which grow on the tip of the stem, of three; form, lance oval, smooth, and entire. Flowers terminal and bent down between the leaves; petals six, greenish white, and revolute; stamens erect and slender. This plant is strikingly, and beautifully regular in the forms of all its parts. Root white with a flavor like the cucumber. Grows in woods. Flowers in July.

CLASS VIII.—OCTANDRIA. *Eight Stamens.*

ORDER 1.—MONOGYNIA. One Pistil.

Genus RHEXIA. Calyx four cleft, inferior; corolla four petalled; anthers curved; capsule four celled, and contained in the calyx.

Species Virginica. Virginian Rhexia. Stem with four winged angles; leaves sessile, oval lanceolate, serrate, ciliate; calyx with glandular hairs.

Calyx hairy with four acute segments; petals four, purple; anthers curved, long, yellow, and making a fine contrast with the petals; stem square with winged edges; leaves opposite, oval, deeply three nerved, with hairs on both sides; peduncles axillary and terminal. Stem eight, or twelve inches high. Grows in low grounds, and has rather a striking appearance among the grass. Flowers in July. Perennial.

ORDER 3.—TRIGYNIA. Three Pistils.

Genus POLYGONUM. Calyx five parted, inferior, resembling a corolla; corolla none; seed one, angular, enclosed in the calyx; stamens from three to fourteen; number of pistils irregular.

Species orientale. Prince's Feather. Stamens seven; styles two, leaves ovate; stipules rough haired.

The red feather-like panicles of this plant are often seen in gardens, and by the sides of fences, rising above most other annuals. Stem round, smooth, green, and divided into portions by joints, or knots. The stipules, are somewhat hypocrateriform; leaves large, ovate, and petiolate.

This exotic came originally from Mount Ararat, but is now naturalized in this country. Knot grass, Buck-wheat, and Water-pepper are species of this genus.

CLASS IX.—ENNEANDRIA. *Nine Stamens.*

ORDER 1.—MONOGYNIA. One Pistil.

Genus LAURUS. Calyx none; corolla six parted, resembling a calyx; nectary composed of three glands surrounding the germ, each ending in two bristles; inner filaments with two glands each; drupe one seeded.

Species sassafras. Sassafras Tree. Leaves either entire, or three lobed, on the same tree.

The root of this tree is a well known, and

among children, a favorite aromatic. Flowers greenish yellow, appearing in May and June; they are often imperfect, the pistils being wanting; in which case the stamens are long and the flowers are more umbelled than the perfect ones. Leaves both oval, and three lobed, the former first appearing. Fruit an oval nut covered with skin, and seated in the cavity of a fleshy receptacle. This part, as well as the young twigs, contains a large quantity of mucilage.

CLASS X.—DECANDRIA. *Ten Stamens.*

ORDER 1.—MONOGYNIA. *One Pistil.*

Genus KALMIA. Calyx five parted; corolla hypocrateriform, with ten prominences underneath; border five horned; capsule five celled.

Species latifolia. Mountain Laurel, Ivy. Leaves scattered, petioled, oval, smooth, and shining; corymbs terminal, viscid and pubescent.

This evergreen shrub bears a profusion of pale red, and white flowers, and is a well known ornament of our woods, both in high and low places. Calyx small, five parted, with oval sharp pointed segments; corolla monopetalous, salver shaped, with a cylindrical tube. On the inside are ten pits or depressions, with corresponding protuberances on the outside. In these pits the anthers are confined, when the corolla expands, the filaments forming rays from the centre where they are attached. On de-

taching the anther from its pit, the filament acts as a spring, throwing the pollen in the form of a little cloud of dust into the air. This shrub grows to the height of from four to fifteen, or twenty feet, and flowers in June.

Genus PYROLA. Calyx five leaved, petals five, stigma three parted ; capsule three celled, three valved.

Species rotundifolia. Round leaved Winter-green. Leaves roundish ; calyx reflected ; flowers in racemes ; styles declined.

The leaves of this little plant may be seen in the woods, spread upon the ground and remaining green throughout the year. Form, roundish ovate ; the largest being about the size of a dollar ; all radical. Scape angular, and six or eight inches high. Flowers in large racemes, white, and very fragrant ; calyx leaves ovate, with the points reflected ; stamens tending upwards and styles downwards. Common in woods. Flowers in June.

ORDER 2.—DIGYNIA. Two Pistils.

Genus DIANTHUS. Calyx tubular, with scales at the base ; petals five, with claws ; capsule cylindrical, superior, one celled.

Species barbatus. Sweet William. Flowers fascicled ; scales, ovate subulate, as long as the tube ; leaves lanceolate ; calyx, with long soft hairs, bracts lanceolate and acute. Grows eighteen inches high, and flowers in June and July. This flower came originally from Germany, but at the present time few gardens are without it.

CLASS XI.—DODECANDRIA. *Twelve Stamens.*

Genus ASARUM. Wild Ginger. Leaves two, reniform; calyx woolly, cleft to the base, the segments spreading.

Species Canadense. Leaves two, radical, and reniform; calyx woolly, three or four cleft, the segments turned back; capsule coriaceous, crowned with the calyx.

A singular plant, found in particular places in our woods, but not everywhere. Leaves reniform, two in number, radical, and on petioles less than a foot high. Flowers solitary, growing close to the ground; calyx hairy, or woolly, consisting of three sepals, of a dull purple color, with their points turned back; filaments reaching above the anthers, germ inferior. Grows in dry woods and flowers from May to July. Perennial.

CLASS XII.—ICOSANDRIA. *Stamens twenty or more; fixed to the calyx.*

ORDER 1.—MONOGYNIA. One Pistil.

Genus PRUNUS. Calyx inferior, five cleft; corolla five-petalled; drupe a nearly smooth stone

Species Virginiana. Wild Cherry. Racemes elongated, erect; leaves, oval oblong, acuminate, unequally serrate, smooth on both sides; petioles with about four glands.

This well known tree bears a profusion of white, fragrant flowers; and in thick forests rises to a great height, but when standing alone it has many branches, and attains no considerable elevation. Calyx five-cleft; corolla consisting of five small white petals; leaves alternate or scattered. The wood is red, and is much used by cabinet makers.

ORDER 4.—PENTAGYNIA. Five Pistils.

Genus PYRUS. Calyx superior, five-cleft; corolla five-petalled; pome five-celled; cells two-seeded.

Species *malus*. Apple Tree. Flowers in sessile umbels; leaves ovate, oblong, acuminate, serrate; claws of the petals shorter than the calyx; styles smooth; petals five, variously colored from red, passing into white; the calyx remains after the apple is ripe. The varieties of this species are innumerable, running through all the grades from the acrid Crab apple, to the luscious Pepin.

ORDER 5.—POLYGYNIA. Many Pistils.

Genus ROSA. Calyx urn-shaped, fleshy, contracted at the orifice, five-cleft; corolla five-petalled; seeds numerous, bristly, fixed to the inside of the calyx.

Species *Caroliniana*. Swamp Rose. Germs globular, hispid; peduncles a little hairy; stem with stipular prickles; petioles prickly.

This is the wild rose, growing in swamps and woods, and rising to the height of six or eight

feet. Corolla five-petalled, and pale red. Leaves pinnate, with five or seven oval leaflets. Fruit a red oblong, or spherical capsule, full of yellow seeds. Flowers in June and July.

The cultivated Roses have the same generic characters as the above, but many of them have become double by cultivation, and although the species are not thus changed, the varieties, with respect both to the number and color of the petals, have become almost innumerable.

CLASS XIII.—POLYANDRIA. *Many Stamens.*

ORDER 1.—MONOGYNIA. *One Pistil.*

Genus TILIA. Calyx five-parted ; petals five ; capsule superior, coriaceous, five-celled, five-valved, opening at the base.

Species Americana. Lime tree, Bass wood. Leaves broad cordate with one lobe truncated, acuminate, sharply serrate and smooth ; petals truncated at top ; nut ovate.

The Bass wood is a common ornamental tree in New England. Leaves large, roundish, heart-shaped at base, with one side shorter than the other. The footstalk of the flower proceeds from the middle of an oblong, pale bracte, which remains on the tree during the winter. Flowers greenish white, with a sweetish, fulsome odor. Flowers in July.

Genus NYMPHÆA. Calyx four or five leaved ; corolla many-petalled, petals and stamens in-

served on the germen ; stigma sessile, marked with radiating lines ; capsule many-seeded.

Species *odorata*. Sweet scented Pond Lily. Calyx four-leaved ; leaves cordate entire, lobes obtuse, divaricate, with prominent veins beneath.

This beautiful aquatic is common in clear ponds, sometimes growing where the water is fifteen or twenty feet deep. Calyx four-leaved, lanceolate, green without, and white within ; petals numerous, lanceolate, smooth, and of a delicate white ; stamens numerous, yellow, in several rows inserted on the germen ; anthers in two longitudinal cells growing to the filaments, and opening inwardly ; stigma a solid moist protuberance, surrounded by from twelve to twenty-four rays. Fruit, a large, many-celled berry, with numerous seeds, which ripen under water.

The vegetable kingdom presents but few flowers whose fragrance is so universally admired as that of the Water Lily.

ORDER 6.—POLYGYNIA. Many Pistils.

Genus *RANUNCULUS*. Calyx five-leaved ; petals from five to eight, with a nectariferous pore at the base of each ; seeds naked.

Species *bulbosus*. Buttercup. Calyx reflexed ; flower-stalks furrowed ; radical leaves ternate ; leaflets petiolate, three-cleft, incisely dentate ; stem erect ; many-flowered.

The bright, varnished, yellow flowers of this plant, are very conspicuous among the grass of meadows and along road sides. Calyx of five

leaves; corolla of six or eight wedge-shaped, roundish petals, with a little nectary near the base; leaves hairy, with from three to five principal divisions, variously gashed or subdivided. Stem erect, and sulcated, bearing many flowers. Flowers in May, and continues all summer. Perennial.

CLASS XIV.—DIDYNAMIA. *Four stamens, two long and two short.*

ORDER 1.—GYMNOSPERMIA. Seeds naked.

Genus GLECHOMA. Upper lip of the corolla bifid, anthers approaching each other and forming a cross.

Species hederacea. Ground Ivy, Gill. Leaves reniform, crenate; stem square. A well known creeping plant along garden fences and other shady places. Calyx striated, and divided into five unequal, pointed segments; corolla blue, the upper lip straight, the lower expanded, and three-lobed; flowers in whorls; leaves opposite, petioled, reniform, and very exactly crenate; taste strong and peculiar. Flowers in May and June. Perennial.

Genus NEPETA. Corolla with the lower lip crenate; the orifice a reflected margin; stamens approximate.

Species catania. Catmint or Catnep. Flowers spiked; the whorls slightly pedunculated; leaves petiolate, cordate, dentate, serrate.

It is hardly necessary to say that Catnep grows almost everywhere about fences and

buildings. Calyx ribbed ; corolla tubular, upper lip straight, lower lip with the middle lobe spreading crenate, and beautifully dotted. Stem two or three feet high, square, leaves long heart-shaped. Perennial.

ORDER 2.—ANGIOSPERMIA. Seeds in a vessel.

Genus GERARDIA. Calyx five-leaved ; corolla somewhat salver-shaped, two-lipped ; the lower lip three-lobed, middle one parted ; capsule two-celled, bursting at base.

Species flava. Yellow Gerardia. Stem nearly simple ; pubescent ; leaves nearly sessile, lanceolate, very entire, or dentate ; the inferior ones incised ; flowers sub-sessile.

The large yellow flowers of this plant give it a showy and rather striking appearance among bushes and trees where it is usually found. Leaves opposite, the lower ones largely dentate, or sub-pinnatifid, the upper ones entire, or sometimes serrate ; flowers opposite, trumpet-shaped, and more or less spiked ; peduncles downy ; style slender and longer than the stamens. These beautiful flowers, as well as the whole plant, grow black in drying. From two to three feet high. Perennial.

Genus CHELONE. Snake Head. Calyx five-leaved ; corolla inflated, the lips closed, one filament sterile, shorter than the rest ; anthers woolly ; capsules two-celled, two-valved.

Species glabra. Leaves opposite, lanceolate, oblong, acuminate, serrate ; flowers in dense spikes, white with a blush of rose color.

Found in wet places, rising two or three feet high, the flower somewhat like a snake's mouth. Calyx nearly sessile, with five short, roundish segments; corolla large, inflated, contracted at the mouth; lower lip in three segments, with two woolly stripes within; style long and slender, and curved downwards. Flowers in August. Perennial.

CLASS XV.—TETRADYNAMIA. *Six stamens, four long and two short.*

ORDER 2.—SILIKUOSA. Seeds in a Silique.

Genus SINAPIS. Calyx spreading; silique cylindrical, with the partition longer than the valves.

Species nigra. Common Mustard. Pods smooth, four-cornered, pressed close to the stem; upper leaves linear lanceolate, entire and smooth.

Calyx and corolla yellow; pods erect, and close to the stalk, square, and ending in a short beak; leaves various, the lower ones rough, and lobed, the upper ones entire and smooth; stem round, striated and branched. Common about the borders of fields and gardens, flowering in June and July.

CLASS XVI.—MONADELPHIA. *Stamens united by their filaments into one parcel.*

ORDER 5.—DECANDRIA. Ten Stamens.

Genus GERANIUM. Calyx five-leaved; pe-

tals five, regular; glands five, honey-bearing, united to the base of the longer filaments, fruit-beaked, separating into five one-seeded capsules.

Species *maculatum*. Cranesbill. Spotted Geranium. Peduncles two-flowered, stem forked, erect; leaves five-parted, and subdivided, the upper ones sessile.

This species is common in our woods, preferring a moist vegetable soil. Leaves large, spreading, and deeply divided into five or seven lobes, which are again cut, or toothed; lower ones on long petioles, the upper ones nearly sessile. Peduncles long and slender, one, two, or three flowers. Calyx five-leaved; petals five, large, purplish blue, and showy. Fruit ending in a long beak, containing five awns, or cocci, which spring out from the lower part and scatter the seeds. Root astringent, and is employed for medicinal purposes. It grows from one to two feet high, and is more worthy of cultivation for parlors, than many Geraniums which have been imported from the Cape of Good Hope.

ORDER 8.—POLYANDRIA. Many Stamens.

Genus MALVA. Calyx double, the outermost two or three-leaved; capsules numerous, one seeded, disposed in a flat ring.

Species *rotundifolia*. Round-leaved Malva. Stem somewhat prostrate; leaves roundish, cordate, obtusely five-lobed; fruit-bear-

ing stalk bent downwards; corolla twice the length of the calyx.

This is a well known little plant, growing about the sides of gardens, and along foot paths. Stem lying on the ground; leaves roundish, and nearly reniform, crenate, and imperfectly five-lobed; petioles long and hairy; stipules lanceolate; flower-stalks axillary; outer leaves of calyx linear, inner ones ovate; petals purplish pink, emarginate; fruit flat, and eaten by children under the name of *cheeses*. Flowers all summer.

CLASS XVII.—DIADELPHIA. *Stamens united into two parcels.*

ORDER 4.—DECANDRIA. Ten Stamens.

Genus LUPINUS. Stamens all united; calyx two-lipped; anthers alternately oblong and roundish; legume coriaceous, swelling over the seeds.

Species perennis. Common, or Blue Lupine. Calyx without appendages; upper lip emarginate, the lower one entire; leaves digitate, with eight, or nine leaflets, obcuneiform. This is a common garden flower, but is found growing wild in various sandy places. Its deep blue flowers, and its regularly formed digitate leaves, give it a handsome appearance. Banner emarginate, lid entire, and terminating in a kind of beak, when the flowers first open.

Leaves like rays attached to the end of the petiole ; flowers in a spike. Perennial.

Genus TRIFOLIUM. Legume hardly longer than the calyx, falling off entire ; flowers generally in heads.

Species pratense. Red Clover. Heads, or spikes dense ; stems more or less ascending ; corollas unequal ; four of the calyx teeth equal ; stipules awned.

Stem weak and often trailing on the ground ; leaves three, oval, with a white spot somewhat heart-shaped on the upper side ; stipules broad, membranous, ribbed, ending in a point or awn ; flowers red, in ovate heads, with a sweetish odor ; calyx in five segments, the lower one longest. This is a well known and highly valued hay-grass.

Genus ROBINIA. Calyx four-cleft, the upper segment two-parted ; banner roundish ; legume compressed, elongated.

Species, pseudocacia. Locust tree. Leaves pinnate with an odd leaflet ; stipules prickly ; racemes pendulous ; calyx teeth unarmed ; legumes smooth.

The wood of this species is yellowish and coarse grained, but is highly valued by ship builders on account of its hardness and durability. It is a tree of middling size.

Leaves compound, pinnate ; leaflets oblong oval on short petioles, and minutely mucronate ; flowers in long pendulous racemes ; calyx inflated, green and purple, four cleft. Corolla white ;

sides of the banner reflexed; legume broad and flat, with a few kidney-shaped seeds. Flowers in June.

CLASS XIX.—SYNGENESIA. *Anthers united into a cylinder; flowers compound.*

ORDER 1.—ÆQUALIS. All the florets with stamens and pistils, and all fertile.

Genus LEONTODON. Receptacle naked; calyx imbricate, with flaccid, lax scales; pappus simple, stipulate.

Species taraxacum. Dandelion. Outer scales of the calyx reflexed; leaves runcinate, toothed, smooth.

No one is so ignorant of plants as not to know the Dandelion. It springs up almost everywhere and flowers all summer. Leaves radical, and lion-toothed; scapes simple, smooth and hollow, each bearing a single bright yellow flower; florets ligulate, or ribbon shaped, and all fertile; outer calyx leaves bent downwards; down of the seeds on little footstalks.

Genus EUPATORIUM. Receptacle naked; down simple; calyx imbricate; style longer than the corolla, cloven half way.

Species perfoliatum. Bone-set. Thoroughwort. Stem erect, round, hairy, branched at top, and passing through the leaves. Leaves perforated by the stem, acuminate, serrate, wrinkled, paler underneath, and hairy; florets tubular, with five spreading segments; calyx

cylindrical, imbricate, the scales lanceolate and acute ; each calyx containing about a dozen florets, stamens five, consisting of soft filaments with blackish anthers united into a tube ; style filiform, the upper end divided into two branches, which project above the flower. Common in low grounds ; flowering in August.

ORDER 2.—SUPERFLUA. Florets of the disk with stamens and pistils ; those of the ray with pistils only ; all fertile.

Genus CHRYSANTHEMUM. Receptacle naked ; down none ; calyx hemispherical, imbricate, with the scales dilated, and membranous at the margin.

Species leucanthemum. White Daisy, White weed. Leaves clasping, oblong, blunt, cut, pinnatifid at base ; radical leaves on foot-stalks, obovate.

Stem one, or two feet high, round furrowed, and bearing a single flower, standing on its tip ; lower leaves on foot-stalks inversely ovate, serrate and variously cut ; calyx closely imbricated ; flower large and nearly flat ; disk yellow, and ray white, consisting of many strap-shaped petals ending in three teeth. This plant, which appears to be an exotic, is by farmers considered a nuisance, as it makes but poor hay, and often intrudes itself into meadows, to the exclusion of valuable grasses.

Genus SENECIO. Receptacle naked ; down simple ; calyx invested with scales, many-leaved, equal ; the scales dead at their tips.

Species aureus. Golden Senecio. Flowers radiate; radical leaves crenate, heart-shaped, petioled; upper ones pinnatifid, lyrate; peduncles thickened upwards; flowers in a lax corymb. Stem upright, simple, smooth, from one to three feet high. Root leaves large, cordate crenate and smooth; middle leaves, lyrate, the upper ones pinnatifid; corymb terminal, the flower stalks growing larger towards the top; calyx smooth, sometimes striped. Flowers deep yellow, and enduring. This is a beautiful perennial, and is worthy of a place in gardens as a border flower.

CLASS XX.—GYNANDRIA. *Stamens situated on the pistil.*

ORDER 2.—DIANDRIA. Two Stamens.

Genus CYPRIPIEDUM. Corolla four petalled, spreading; lip inflated, hollow; capsule three valved, one celled; many seeded.

Species acaule. Ladies' Slipper. Scape leafless, one flowered; root leaves two, oblong, obtuse; lobe of the style round-rhomboidal, acuminate, deflexed; petals lanceolate; lip longer than the petals, cleft before.

This flower has a singular and very striking appearance, especially when contrasted with the dry leaves and brush of the woods where it is found. Leaves two, large, radical, oval-lanceolate, plaited and hairy. Scape a foot high, on the tip of which is suspended, generally,

a single large purple flower; petals four, long spreading, greenish purple, and slightly twisted; nectary, an inflated, purple bag, veined, and longer than the petals; this forms the principal part of the flowers; style situated over the base of the nectary to which are attached two lateral anthers. Flowers in May and June. Perennial.

CLASS XXI.—MONŒCIA. *Staminate and pistillate, or barren and fertile flowers, on the same plant.*

ORDER 3.—TRIANDRIA. Three Stamens.

Genus TYPHA. Ament of barren flowers, cylindrical, hairy; anthers about three on each filament. Ament of fertile flowers cylindrical; seed one, on a feathery pedicel.

Species latifolia. Water Flag, Cat's Tail. Leaves somewhat ensiform; barren and fertile spikes approximated.

This flag rises to the height of from four to ten feet, and is common in the shallow water of ponds and rivers, or along their margins. Leaves several feet long, linear sword shaped, and when dry, appear full of little cells. Stem straight, round, and gradually tapering to the ament, which is a compact cylinder containing the fertile flowers. Above this is a smaller cylinder or spike, of staminate flowers. The leaves of this plant are useful in making chair seats, and in corking the seams of casks.

ORDER 5.—PENTANDRIA. Five Stamens.

Genus AMBROSIA. Barren flowers, calyx common, one-leaved ; florets funnel form, three or five-cleft ; receptacle naked. Fertile flowers, calyx one-leaved, one-flowered ; corolla none ; nut-toothed, one-seeded.

Species elatior. Roman Worm-wood. Bitter weed. This is a troublesome weed, which every body knows by sight, though only a few may know its proper name. It grows in fields after the crops of wheat, rye or oats, have been removed, often covering whole acres to the great annoyance of the farmer. It is also abundant about houses and gardens. The barren flowers are terminal, and hang in a crowded spike, the pollen giving them a yellowish mealy appearance. Fertile flowers situated close to the stalk, and in the axis of the leaves ; lower leaves twice pinnatifid, the upper ones pinnatifid ; stem erect, branched, and from one to four feet high.

There is another species of this genus called Giant Ambrosia, (*Ambrosia trifida*,) which grows in great abundance along the uncultivated banks of Connecticut river. This often rises to the height of ten or twelve feet, and forms almost impenetrable thickets. Leaves three-lobed ; stalk round, striated, and often an inch and a half in diameter at the base.

ORDER 8.—POLYANDRIA. Eight, or more Stamens.

Genus CALLA. Spathe ovate ; spadix covered with flowers ; corolla none ; berry many-seeded.

Species palustris. Northern Calla. Water Arum. Leaves heart-shaped ; spathe ovate ; spadix covered with perfect flowers.

This plant grows in bunches along the borders of brooks and ponds, sometimes standing in the water. Leaves heart-arrow shaped, on long petioles, smooth, entire, and handsome. Scape a foot or two high ; spathe oblong, spreading, green outside, and white within, ending in a cylindrical, curved point. Spadix, cylindrical, oblong, covered with minute yellowish white flowers. This plant resembles the Calla Ethiopica in appearance.

Genus CASTANEA. Barren flowers. Ament naked ; calyx none ; stamens from eight to twelve. Fertile flowers ; calyx, from four to six toothed, hairy ; corolla none ; germs two ; nuts two, contained in a coriaceous, four-cleft, prickly calyx.

Species Americana. Chestnut tree. Leaves oblong lanceolate, acuminate, mucronate, serrate, naked underneath.

All our young friends know the fruit of the Chestnut tree, and probably most of them the tree itself. Leaves six or eight inches long, lanceolate, serrate, with pointed teeth. Aments in the form of strings hanging near the ends of

the branches and as long as the leaves, color yellowish. These contain the stamens, and proceed from a kind of calyx, containing the pistils which enlarges and becomes the spined capsule, or Chestnut burr. This is one of our largest forest trees. Flowers in June.

Genus PLATANUS. Aments globular. Barren flowers; corolla hardly visible; anthers growing around the filament. Fertile flowers; corolla many parted; stigma recurved; seeds roundish, with a capillary down at the base.

Species occidentalis. Button-wood. Sycamore. Leaves lobed-angular; branches whitish.

This is one of the largest American trees. Leaves with five angles, obscurely lobed, and downy underneath, along the veins, when young. Flowers in globular aments, or balls, succeeded by seeds, crowding each other. The receptacle on which they are placed is a hard ball, covered with a curious, and beautiful net work, which may easily be taken off. The balls are suspended all winter, by their strong elastic peduncles. This tree every year throws off a part of its outer bark, and thus appears clean and smooth.

CLASS XXII.—DICECIA. *Barren and fertile flowers on different plants.*

ORDER 2.—DIANDRIA. Two Stamens.

Genus SALIX. Calyx, scale of an ament; corolla none; stamens, in the barren flowers,

from one to five, with a nectariferous gland at the base. Stigmas, in the fertile flowers, two; capsule one-celled, two-valved; seeds downy.

Species *eriocephala*. Swamp Willow. Diandrous; twigs downy; leaves oblong-oval, somewhat retuse at base, serrulate; aments oblong, exceedingly villous.

This is a small tree which grows in wet places, and is known in some parts of the country under the name of *pussy-willow*, probably from the fur-like appearance of the aments, which appear in the early spring. The scales of both the barren and fertile aments, are covered with long, smooth silken hairs, thickly set, so as to give them the appearance of wool, or fur. In the barren aments, each scale has two long yellow anthers; hence the flowers are *diandrous* or two-stamened. The fertile aments are the longest, and each scale produces an oblong, tapering, downy germ. The leaves are oval, oblong, and nearly entire. They do not appear until several weeks after the aments. Sometimes the two trees bearing the different aments, are near each other. and sometimes not.

GLOSSARY

OF

TERMS USED IN BOTANY.

- A*, in composition, signifies wanting, or without, as *acaulis*, without a stem.
- Abortive*. Producing no fruit. Ex. Snowball.
- Abrupt*. Terminating suddenly, as if cut off, as in the root of Bloodroot.
- Abruptly-pinnate*. Wanting the odd terminal leaf. Ex. Cassia Marylandica, (*Senna*.)
- Acerose*. Stiff and slender with a sharp point. Ex. Leaves of the pine.
- Achlamydeous*. Flowers without calyx or corolla. Ex. Willow, Birch.
- Acicular*. Needle-shaped.
- Acinaciform*. Scimeter-shaped. Linear, sharp edged and crooked.
- Acinus*. One of the protuberances in a compound berry. Ex. Rubus vilosus, (*Blackberry*.)
- Acotyledonous*. Having no cotyledons or seed-lobes. Ex. Mushrooms.
- Aculeate*. Prickly. Ex. Rose bush.
- Aculeus*. A prickle growing to the bark, but not to the wood. Ex. Rose bush, Fig. 127.
- Acuminate*. Ending in an extended sharp point. Ex. *Urtica dioica*, (*Common Nettle*.) Fig. 72.
- Acute*. Ending in a sharp point, but less extended than acuminate. Ex. Leaves of *Asclepias*, (*Milk-weed*.)
- Adelphous*. Brotherhood. Applied to plants whose stamens are united by their filaments. Ex. Pea, Mallows.
- Adnate*. Adhering to a thing. Anthers are called adnate, when they adhere to the filaments by their whole length.

- Adult.* Full grown. An adult plant is one that has obtained its full size.
- Æstivation.* Præfloration. The manner in which the floral envelopes are arranged before they expand.
- Agglomerated.* Collected into a head. Crowded together. Ex. Cauliflower.
- Aggregated.* Collected together, as when many flowers grow on the same receptacle, not compound. Ex. Armeria, (*Thrift*.)
- Alated.* Winged. Ex. Seeds of the Maple.
- Albumen.* The tough substance surrounding the embryo of certain seeds. Ex. Reseda, (*Mignonette*.)
- Albuminous.* Partaking of the nature of albumen.
- Algæ.* An order of Cryptogamous plants, including the Sea-weeds.
- Alternate.* Placed one after the other. The leaves of the Asters are alternate.
- Alveolate.* Like a honey-comb. Applied to the involucre of certain plants. Ex. Borkhausia.
- Ament.* A catkin. A certain mode of inflorescence. Ex. Chestnut, Birch.
- Amplexicaul.* Clasping the stem. The leaf joins the stalk without a petiole. Ex. Aster amplexicaulis.
- Ancipital.* Two-edged.
- Androgynous.* Producing both barren and fertile flowers on the same plant. Ex. Indian corn.
- Angulo-dentate.* Angularly toothed. Ex. Lapsania, (*Nipplewort*.)
- Annual.* Living but one year, in which time it produces flower and seed. Ex. Cucumber.
- Anther.* That part of the stamen which contains the pollen very apparent in the lilies, Fig. 7.
- Annulations.* Rings or circles.
- Anterior.* Growing before, or in front, as the anterior segments of a leaf.
- Antiseptic.* Efficacious against putrefaction. Ex. Artemisia, (*Wormwood*.)
- Apetalous.* Without petals. Ex. Saururus.
- Apex.* The extremity or summit generally terminating in a point.
- Aphyllous.* Without leaves. Ex. Saltwort.
- Appressed.* Pressed close upon something else. When hairs lie close to the surface of a leaf they are said to be appressed.

- Apterous.* Without wings or membranous margins. Ex. The radical flowers of *Polygala Rubella*.
- Arachnoid.* Resembling a spider's web.
- Aquatic.* Growing in the water. Ex. Pond Lily.
- Arborescent.* Tree-like Approaching in size to that of a tree. Ex. *Cornus Florida*, (*Dogwood*.)
- Arillus.* An appendage adhering to the hilum of certain seeds.
- Aristate.* Bearded. Ex. Barley.
- Armed.* Furnished with thorns or prickles. Ex. Thorn-bush, Green Briar.
- Aroma.* The aromatic or spicy quality of plants. Ex. Mint, Sassafras.
- Articulated.* Jointed. The place where one part is joined to another: Many of the grasses have articulated culms.
- Arundinaceous.* From *arundo*, a reed. Resembling reeds, or large grasses.
- Ascending.* Rising somewhat obliquely from the ground.
- Attenuated.* Diminishing. Growing thin, or slender.
- Auriculate.* Furnished with appendages or projections resembling ears. Ex. *Jasminum ariculatum*.
- Awn.* The rough beard, or bristle in the flowers of the grasses.
- Awned.* Having awns.
- Axis.* Centre of vegetation, as the pith of vascular plants. The Cryptogamia and Endogenous plants have many of them no axis.
- Banner.* The upper and largest petal in papilionaceous flowers. Ex. Pea, Bean.
- Barren.* Producing no fruit. Containing stamens, without pistils.
- Bell-shaped.* Campanulate. A short tube, rounded at the base, and wide at the brim. Ex. Bell-flower.
- Berry.* A succulent fruit with the seed imbedded in the substance. Ex. *Phytolacca decandria*, (*Poke*.) Orange.
- Bicuspidate.* Ending in two points.
- Biennial.* Living two years, during the second of which the flower and seeds are produced. Ex. Beet, Turnip.
- Bifid.* Two-cleft; nearly divided into two parts.
- Biocular.* Having two cells, Fig. 37.
- Bipinnate.* Doubly winged. When both the leaf and its subdivisions are winged. Ex. Honey Locust, Fig. 91.

- Biternate.* Twice ternate. The petiole bearing three ternate leaves. Ex. *Fumaria lutea*, (*Fumitory*), Fig. 84.
- Bivalve.* Two-valved. Ex. Pea-pod.
- Border.* The edge or spreading part of the corolla.
- Brachiate.* Branches opposite, like the arms, each pair crossing those below, or alternately crossing each other, Fig. 106.
- Bract.* Floral leaf. This is placed near the flower, and differs from the other leaves. Ex. *Bartsia coccinea*, (*Painted Cup*.)
- Bristle.* Rigid hairs. Not prickly.
- Bulbous.* Having bulbs, or globular protuberances, as the Tulip root, Fig. 118.
- Bulbs.* Under ground buds, or roots consisting of scales lying one over the other. Ex. Onion. Some of the Lily tribe bear bulbs in the axils of their leaves. Ex. *Lilium bulbosum*.
- Caducous.* Falling off early; sooner than deciduous. Ex. Calyx of the poppy.
- Caspitose.* Grass-like, forming little tufts. Ex. Pink, Thrift.
- Calcarate.* Spurred, or spur-shaped. Ex. Larkspur.
- Calyxiform.* Shaped like a calyx.
- Calyculated.* Furnished with an additional outer calyx. Ex. Hibiscus.
- Calyptra.* Literally an extinguisher. The cap which tips the theca of a moss.
- Calyptrate.* Having a covering resembling an extinguisher.
- Calyx.* The outer and lower portions of a flower, commonly of a green color. Ex. Pink, Fig. 1.
- Campanulate.* Shaped like a bell, Fig. 16.
- Canescent.* Whitish. Hoary.
- Canaliculate.* Having channels or furrows.
- Capillary.* Very slender, resembling hair.
- Capitate.* Growing in small heads, Ex. Trefoil, (*Clover*), Fig. 35.
- Capituli.* Little heads. Ex. Reseda, (*Mignonette*.)
- Carina.* A keel like that of a boat; also the two lower petals of papilionaceous flowers. Ex. Pea, Bean.
- Carinate.* Keel-shaped. Ex. *Urticularia minor*, (*Bladderwort*.)
- Carious.* Decayed.

- Carminitive.* Stomachic substances, which relieve pain. Ex. Peppermint, Caraway.
- Carnose.* Fleshy in substance.
- Carpella.* The small parts of which compound fruits are formed. Ex. Actinocarpus.
- Carpology.* The science which treats of the structure of fruits and seeds.
- Catkin.* See Ament.
- Caudate.* Tailed, having a tail-like appendage.
- Caudex.* The upper part of the root whence the stalk springs.
- Caulescent.* Having a true stem which bears leaves. Ex. Hibiscus.
- Cauline.* Growing on a stem.
- Cell.* A cavity or compartment, generally applied to a capsule or seed-vessel, Fig. 37.
- Cellulares.* The second division of Lindley's system of plants, having cells but not spiral vessels. Ex. Mushrooms.
- Cellular.* Made up of little cells. Ex. Stem of the Eriocaulon.
- Cephalic.* Good for the head.
- Cernuous.* Nodding or drooping. Ex. Geum rivale, (*Water avens*.)
- Chalaza.* A spot on the seed, indicating the spot where the vessels of the raphe terminated.
- Chaffy.* Made of membranes like chaff. Ex. Gnaphalium, (*Life Everlasting*.)
- Cilicle.* Fringed with hairs, like the eye-lashes. Ex. Lopezia cordata.
- Cineros.* Ash-colored; grey. Ex. Grevillia cinerea.
- Cirrrose.* Tendrilled, having claspers. Ex. Gourd, Gloriosa.
- Clasping.* Partly surrounding the stalks, as the leaves of Garden Lettuce.
- Clavate.* Club-shaped. Largest at the top. Ex. Pedicels of Actea rubra.
- Claw.* The narrow part of the petal, where it is attached. Ex. Pink, Fig. 21.
- Cleft.* Divided less than half way. Mostly applied to the calyx.
- Coadnate.* Uniting, or adhering at the base.
- Colored.* Some color different from green, the usual color of plants.
- Compound.* Used in botany to express the union of several things in one: thus a compound flower consists of many small florets, or simple flowers; a compound umbel is made up of several smaller umbels, &c.

- Compressed.* Pressed together; flattened.
- Cone.* The fruit of the Pine tribe, Fig. 49.
- Conglomerate.* Crowded together in a spherical form.
- Connate.* Joined together at the base. Ex. *Triosteum perfoliatum*, Fig. 101.
- Connivent.* Converging, or approaching each other. Ex. *Datura ferox*.
- Contorted.* Twisted. Bent from the ordinary position.
- Corculum.* The germ or embryo of the future plant, contained in the seed commonly between the cotyledons. Ex. Garden Bean.
- Cordate.* Heart-shaped. Ex. Leaves of the *Aster macrophyllus*, Fig. 57.
- Coriaceous.* Resembling leather. Thick and tough. Ex. Leaves of the *Chionanthes Virginica*, (*Virginian Fringe-Tree*.)
- Corneous.* Horny. Having the consistence of horn.
- Corniculate.* Horn-shaped.
- Corolla.* The delicate colored part of the flower, on which its beauty generally depends. It is the second covering of the bud within the calyx. See p. 18, Fig. 2.
- Cortical.* Belonging to the bark.
- Corymb.* A raceme or panicle, in which the stalks of the lower flowers, being longest, the whole is nearly flat on the top. Ex. *Achillea*, (*Yarrow*.) Fig. 40.
- Corymbose.* Formed after the manner of a corymb.
- Costæ.* Literally ribs; applied by botanists, sometimes to the midrib of the leaf, and sometimes to any projecting round elevations, having the same direction as the axis of the fruit.
- Costate.* Ribbed.
- Cotyledons.* Seed-leaves or seed-lobes. The fleshy parts of seeds, well known in the Bean, as the two halves which are separated in the act of sprouting, and rise above the ground.
- Crenate.* Notched, or scalloped, the divisions being rounded. Ex. *Glechoma herderacea*, (*Gill*.)
- Crenulate.* Full of notches.
- Crest.* Applied to some elevated appendage terminating a particular organ: a stamen is crested when the filament projects beyond the anther.
- Cruciform.* Having four petals placed like a cross. A flower is cruciform, or cruciate, when four equal petals are placed opposite to each other at right angles. Ex. Cabbage, Fig. 23.

- Crystalline.* Resembling crystals. Ex. *Mesembryanthemum lanceolata*.
- Cryptogamous.* Belonging to the Cryptogamia, the last of the Linnæan classes, and in which neither stamens nor pistils are visible. Ex. Fern, (*Polypod.*) Fig. 104.
- Cucullate.* Hooded, or cowled. Ex. Spathe of the *Arum triphyllum*, (*Indian Turnip.*)
- Cucurbitaceous.* Gourd, or melon-like.
- Culm.* The stem of Grasses, and similar plants. Ex. Wheat, Fig. 109.
- Culmiferous.* Producing culms.
- Cultrate.* Shaped like a pruning-knife.
- Cunate.* Wedge-shaped.
- Cuspidate.* Having a sharp straight point, Fig. 73.
- Cuticle.* The outer skin or epidermis.
- Cut-toothed.* Cut and toothed at the same time.
- Cyathiform.* Cup-shaped. Formed like a wine-glass. Ex. *Narcissus pulchellus*.
- Cylindrical.* Cylinder-shaped; round but not tapering. Ex. *Salicornia radicans*.
- Cyme.* A mode of inflorescence in which the flower-stalks rise from the same point, but are afterwards variously subdivided. Ex. *Scirpus lacustris*.
- Decagynous.* Having ten styles. Ex. *Phytolacca decandria*, (*Poke.*)
- Decandrous.* Having ten stamens. Ex. Plants of the 10th Class, as *Kalmia*, *Pyrola*.
- Deciduous.* Falling off. It means later than *Caducous*. All plants which shed their leaves at autumn are called deciduous, and are thus distinguished from *evergreens*.
- Declinate.* Tending downwards. Ex. Stamens of the *Rhododendron maximum*.
- Decomound.* Twice compound. A leaf is decomound when it is twice pinnated. Ex. *Cassia*, *Mimosa*.
- Decorticated.* Disbarked. When the bark is wanting.
- Decumbent.* Lying down, or leaning on the ground. Ex. *Lespedeza prostrata*.
- Decurrent.* When the edge of the leaf runs down the stem. Ex. Many of the Thistles.
- Decursive.* Having a tendency to run down.
- Decussating.* Crossing each other in pairs. Ex. *Bidens crysanthemoides*.
- Deflected.* Bent to one side.

- Dehiscent.* Gaping or opening. Applied to the opening of capsules, or the mode in which they discharge their seeds.
Ex. Columbine. The capsule of the Poppy is *indehiscent*, discharging its seeds by orifices.
- Deltoid, or Delta-leaved.* Shaped like the Greek Delta Δ
Ex. *Prenanthes alba*.
- Dentate.* Toothed, having the margin divided into incisions resembling teeth. Ex. *Veronica acuta*, Fig. 46.
- Dentato-sinuate.* Toothed and scalloped. Ex. *Gerardia flava*.
- Denticulate.* Minutely toothed.
- Dentures.* Teeth. The sharp points which separate the notches of leaves.
- Depressed.* Pressed in at top, or flattened. Ex. Capsule of the Poppy.
- Diadelphous.* Having the stamens united into two parcels.
Ex. Pea, Bean, see p. 158.
- Diandrous.* Having two stamens. Ex. *Collinsonia*.
- Dichotomous.* Forked. A stem that ramifies in pairs.
- Dicocous.* Having two cocci, grains, or seeds.
- Dicotyledonous.* Having two cotyledons. Ex. Bean.
- Didynamous.* Belonging to the class *Didynamia*; characterized by two long and two short stamens and a ringent corolla. Ex. Hyssop, Mint.
- Digitate.* Finger-shaped. When the leaf is composed of five parts all distinct and uniting on the same petiole. Ex. *Panax quinquefolium*.
- Digynous.* Having two styles. Ex. *Gerardia*.
- Diocious.* Having barren flowers on one plant and fertile ones on another. Ex. Willow.
- Discoid.* Applied to compound flowers, when there is no ray, the centre being filled with florets. Resembling a disk.
- Dissepiment.* The partitions by which a capsule is divided.
- Distichous.* Growing in two opposite rows or ranks. Ex. Leaves of the Lily and Iris.
- Divaricate.* Growing in a straggling manner. Ex. *Veronica pinnatta*. Also, diverging so as to turn backwards.
- Dodecandrous.* Having twelve stamens. Ex. *Agrimony*.
- Divergent.* Spreading widely from a centre.
- Dolabriform.* Axe or hatchet-shaped.
- Dorsal.* Growing on the back.
- Drupe.* A succulent fruit, or rind, containing a bony nut or stone in the centre. Ex. Cherry, Fig. 42.

Drupaceous. Resembling or bearing drupes.

Echinate. Beset with prickles. Hedge-hog like. Ex. *Amomum subulatum*.

Elliptic. Oval; as the leaves of *Magnolia glouca*.

Elongated. Exceeding a common or average length.

Emarginate. Having a notch in the end. Ex. *Canna coccinea*.

Embryo. The same as corculum.

Enneandrous. With nine stamens.

Ensiform. Sword-shaped; two-edged; as the leaves of *Iris versicolor*.

Entire. Even and whole at the edge; as the leaves of *Rhus vernix*.

Equitant. Edges of the leaves alternately lapping over each other. Ex. *Iris*.

Ephemeral. Lasting but a day.

Epidermis. See Cuticle.

Epigynous. Above the germen.

Eroded. Appearing as if gnawed at the edge.

Esculent. Eatable.

Evergreen. Remaining fresh through the winter. Not deciduous. Ex. *Kalmia*.

Exserted. Projecting or extending out of the flower or sheath.

Endogenous. Increasing on the inside. Ex. Cane.

Exogenous. Increasing on the outside. Ex. Oak.

Falcate. Sickle-shaped. Linear and crooked.

Farina. The pollen. Also meal or flower.

Farinaceous. Mealy.

Fascicle. A bundle. Ex. Sweet William.

Fascicled, or fasciculate. Collected in bundles.

Fastigate. Flat topped. Ex. *Aster umbellata*.

Favose. Resembling a honey-comb.

Ferns. An order of Cryptogamous plants bearing the fructification commonly on the back of the leaf, or in spikes, made up of minute capsules opening transversely. Ex. Polypody, (*Polypod*.)

Fertile. Containing perfect pistils and yielding fruit.

Filiform. Thread-like or very slender.

Fimbriate. Finely divided at the edge like fringe. Ex. *Orchis fimbriata*.

- Fistulous.* Hollow or tubular. Ex. *Eupatorium verticillatum*.
- Flabelliform.* Spreading like a fan.
- Flagelliform.* Like a whip-lash.
- Flexuous.* Serpentine or zigzag.
- Floral-leaf.* See Bracte.
- Floral envelopes.* The calyx, bractæ, and corolla, which envelope the inner parts of the flower.
- Foot-stalk.* The stalk of either flower or leaf. Ex. Aster.
- Floret.* A little flower. One in an aggregate or compound flower.
- Floscular.* A floret in a compound flower which is tubular, not ligulate.
- Follicle.* A seed-vessel which opens lengthwise, or on one side only; as in *Apocynum androsæmifolium*. Fig. 41.
- Fron.* The leaf of a cryptogamous plant. Ex. Fern.
- Fructification.* The flower and fruit with their parts.
- Frutescent.* Becoming shrubby.
- Fruticose.* Shrubby.
- Fugaceous.* Lasting only for a short time.
- Fungi.* The order of a cryptogamous plant to which the Mushrooms belong.
- Fungous.* Growing rapidly and preternaturally, with a soft texture like the *fungi*. Ex. Mushrooms, (*Toad-stools*.)
- Funnel-shaped.* Tubular at bottom and gradually expanding at top; as the flowers of *Datura stramonium*.
- Fulvous.* Yellow; fox-colored.
- Furfuraceous.* Resembling bran.
- Fusiform.* Spindle-shaped. When a root is large at top and tapers downwards as in the Carrot and Radish.
- Galls.* Excrescences caused by the bite of an insect. Ex. Oak galls.
- Gemmaceous.* Belonging to a bud. Made of the scales of a bud.
- Generic.* Belonging to a genus.
- Geniculate.* Bent like a knee.
- Genus.* A family of plants agreeing in their flower and fruit.
- Germ.* The lower part of the pistil, which afterwards becomes the fruit.
- Germination.* The sprouting of a seed.
- Gibbous.* Swelled out, commonly on one side.
- Glabrous.* Smooth as it regards hairiness or pubescence. Ex. *Kalmia*.

- Gland.* A small roundish appendage, apparently performing some function of secretion or excretion. Ex. Moss Rose.
- Glandular pubescence.* Hairs tipped with little heads or glands.
- Glaucous.* Sea-green. Pale bluish green.
- Glume.* The scales, valves, or chaff, which make the calyx and corolla of grasses. Ex. The Oat. Fig. 12.
- Glutinous.* Adhesive, viscid, covered with an adhesive fluid. Ex. *Salvia Glutinosa*.
- Gramina.* Grasses and grass-like plants. Ex. Wheat.
- Gramineous.* Resembling grasses.
- Granular.* Formed of grains, or covered with grains.
- Gymnospermous.* Having naked seeds. Ex. Mint.
- Gynandrous.* Having the stamens growing on the pistils. Ex. Ladies' slipper.
- Gyrose.* Turning round like a crook.
- Habit.* The general external appearance of a plant by which it is known at sight.
- Halberd-shaped.* See *Hastate*.
- Hastate.* Shaped like a halberd. It differs from *arrow-shaped* in having the barbs or lateral portions more distinct and divergent. Ex. *Prenanthes alba*.
- Head.* A dense round collection of flowers, which are nearly sessile. Ex. Clover.
- Helmet.* The concave upper lip of a labiate flower.
- Heptandrous.* Having seven stamens. Ex. *Trientalis*.
- Herb.* All that portion of a plant which is not included in the root, or fructification; as the stem, leaves, &c.
- Herbaceous.* Not woody. Ex. Indian Corn, Cabbage.
- Hexandrous.* With six stamens. Ex. Lily, Tulip.
- Hilum.* The scar or mark on a seed, where it was attached to the plant, or seed-vessel.
- Hirsute.* Rough with hairs. Ex. *Agrimonia eupatoria*.
- Hispid.* Bristly. More than *hirsute*. Ex. *Justicia ciliaris*.
- Hooded.* See *Cucullate*.
- Horn.* See *Spur*.
- Hyaline.* Crystalline, transparent.
- Hybrid.* A mongrel or intermediate species between two others, from which it is descended.
- Hypocrateriform.* Salver-shaped. With a tube abruptly expanded into a flat border.
- Hypogynous.* Situated below the germen.

Icosandrous. Having about twenty stamens growing on the calyx and not on the receptacle. Belonging to the class Icosandria.

Imbricate. Lying over each other like scales, or the shingles of a roof.

Included. Wholly received or contained in a cavity. The opposite of *exserted*.

Incrassated. Thickened upward. Larger toward the end.

Incumbent. Lying against or across.

Indigenous. Native. Growing originally in a country.

Indusium. Plural Indusia. The involucre, or veil which covers the fruit of Ferns.

Indehiscent. Not gaping, or opening by valves.

Inferior. Lowermost. Used to express the relative situation of the calyx and germ. An inferior flower is one in which the calyx and corolla are below the ovarium.
Ex. *Rhexia Virginica*.

Inflated. Tumid and hollow. Blown up like a bladder.

Inflorescence. The manner in which the flowers are situated or connected with the plant, and with each other.

Infundibuliform. Funnel-shaped, which see.

Inserted into. Growing out of.

Internode. The space between joints.

Interruptedly pinnate. When smaller leaflets are interposed among the principal ones. Ex. *Agrimonia Eupatoriæ*.

Involucre, or Involucrum. A sort of general calyx serving for many flowers; generally situated at the base of an umbel, or head; as in *Conium maculatum*.

Involucel. A partial involucre.

Irregular corolla. Having its upper and lower sides unlike.
Ex. Violet.

Joints. The places where two pieces of stem are articulated.

Keel. The under petal of a papilionaceous flower. Also the lower side of the midrib of a leaf.

Keeled. Shaped like a keel.

Kernel. The nucleus or seed of a nut.

Kidney-shaped. Heart-shaped without the point, and broader than long.

Labellum. The front section of an orchideous flower.

Labiata. Having an upper and lower lip, as in flowers of the class Didynamia. Fig. 19.

- Laciniate.* Cut, torn, and jagged. Fig. 66.
- Lactescent.* Yielding a white, or milky juice, when wounded.
- Lamellated.* In thin plates.
- Lamina.* The border or flat end of a petal, in distinction from its claw. Also a thin layer, plate or membrane of any kind.
- Lanceolate.* Spear-shaped. Narrow with both ends acute, as in the leaves of *Erythronium Americanum*.
- Lanuginous.* Woolly.
- Lateral.* At the side.
- Leaf-bud.* That part of the plant by which the individual is propagated.
- Leafet.* A partial leaf. A constituent of a compound leaf.
- Legume.* A pod or seed-vessel having its seeds attached to one side or suture; commonly of a long form and not joined. Fig. 38.
- Leguminous.* Bearing legumes.
- Liber.* The inner bark.
- Ligneous.* Woody.
- Ligulate.* Ribbon-shaped. A kind of corolla found in compound flowers, consisting of a tube at bottom, continued into a long flat portion at top; as in the florets of the Dandelion.
- Liliaceous.* Resembling the Lily.
- Limb.* The border or spreading part of a monopetalous corolla.
- Linear.* Long and very narrow, with parallel sides; as the leaves or grasses.
- Lip.* The upper or under side of the mouth of a labiate corolla or nectary. In orchideous plants, the lower lip of the nectary is usually the most conspicuous part of the flower.
- Lobe.* A large division or distinct portion of a leaf or petal.
- Lobed.* Divided into lobes; as the leaves of *Laurus sassafras*. Fig. 68.
- Loculicidal dehiscence.* When the valves open vertically, the compartments remaining as in Lilac, Lily.
- Loment.* A pod resembling a legume, but divided by transverse partitions.
- Lunate.* Shaped like a half moon. Fig. 58.
- Lyrate.* Pinnatifid, with a large roundish leafet at the end. Fig. 60.
- Marcrescent.* Withering.

- Maritime.* Growing near the salt water.
- Medulla.* The pith.
- Membranous.* Very thin and delicate.
- Midrib.* The large central vein of a leaf which is a continuation of the petiole.
- Monadelphous.* Having the stamens united into a tube at base. Ex. Mallows.
- Monandrous.* Having one stamen. Ex. Saltwort.
- Moniliform.* Arranged like the beads of a necklace.
- Monœcious.* Having barren and fertile flowers on the same plant. Ex. Alder.
- Monogynous.* With one style. Ex. Lily.
- Monopetalous.* Having but one petal, i. e. the corolla of one piece. Ex. Datura.
- Monophyllus.* Consisting of one leaf or piece.
- Mosses.* The second order of the class Cryptogamia. Small plants with lids on the capsules.
- Mucronate.* Having a small point projecting from an obtuse end.
- Multipartite.* Many-parted. Ex. Leaf of Yarrow.
- Muricate.* Covered with sharp spines or prickles. Ex. *Panicum muricatum*.
- Musci.* See *Mosses*.
- Nectariferous.* Bearing honey.
- Nectary.* The part of the flower which produces honey. The term is also applied in certain instances to any internal, supernumerary part of the calyx or corolla.
- Nerves.* Parallel veins.
- Nerved.* Marked with nerves. Ex. Narrow plantain.
- Nodding.* Inclining to one side. Partly drooping.
- Nucleus.* The kernel or seed of a nut.
- Nut.* A seed enclosed in a hard shell. Hazel-nut.
- Ob.* A particle, which when prefixed to any other term, denotes the inversion of the usual position; as, obovate, obcordate, &c., i. e. inversely ovate, inversely cordate, &c.
- Obconic.* Conic with the apex downward.
- Obcordate.* Heart-shaped, with the point inward, or downward.
- Oblong.* Longer than oval, with the sides nearly parallel. Fig. 52.
- Obovate.* Ovate, not inverted.
- Obsolete.* Indistinct, appearing as if worn out.

- Obtuse.** Blunt, rounded, not acute. Fig. 75.
- Ochroleucous.** Whitish yellow.
- Octandrous.** With eight stamens. Ex. *Epilobium*.
- Officinal.** Kept for sale as medicinal.
- Opaque.** Not transparent.
- Operculum.** The lid which covers the capsules of mosses.
- Opposite.** Standing directly against each other on opposite sides of the stem; as the leaves of *Spigelia*, *Marilandica*. Fig. 95.
- Orbicular.** Circular. Fig. 48.
- Orchideus plants.** A second order of plants in the class Gynandria, having irregular flowers, a remarkable lip, and glutinous pollen. Related to the genus *Orchis*.
- Oval.** Elliptical; as the leaves of *Magnolia glauca*. Fig. 51.
- Ovate.** Egg-shaped. Oval with the lower end largest; as the leaves of *Sabbatia angularis*. Fig. 49.
- Ovarium.** The part formerly called germen.
- Ovules.** The young seeds of the plant contained in the ovary.
- Palate.** A large obtuse projection which covers the throat of a personate flower.
- Palaceous.** Chaffy. Ex. Receptacle of bidens.
- Palmate.** Hand-shaped. Deeply divided into spreading and somewhat equal segments; as the leaves of *Podophyllum peltatum*. Fig. 67.
- Panduriform.** Contracted in the middle, like a violin. Fig. 61.
- Panicle.** A loose, irregular bunch of flowers, with subdivided branches. Ex. Grasses. Fig. 33.
- Papilionaceous.** Having an irregular corolla, like the Pea blossom; consisting of four petals, of which the uppermost is called the *banner*; the two lateral ones *wings*; and the lower one, which is commonly boat-shaped, the *keel*. Mostly belonging to the class Diadelphia. Fig. 22.
- Pappus.** The down of seeds. A feathery appendage.
- Parasitic.** Growing on another plant and drawing nourishment from it.
- Parenchyma.** The cellular substance of vegetables. Ex. Mushrooms.
- Partial.** This term is applied to small or constituent parts, in distinction from general.
- Partition.** The dividing wall in seed-vessels. Fig. 38.

- Parted.* Deeply divided, more than cleft. Ex. Corolla of *Trientalis*.
- Pectinate.* Like the teeth of a comb. Intermediate between fimbriate and pinnatifid.
- Pedate.* Having a central segment or leaf which is simple, and two lateral ones which are compound. Fig. 86.
- Pedicel.* The ultimate branch of a peduncle. A little stalk.
- Peduncle.* A stem bearing flowers or fruit, which is the branch of another stem.
- Pellicle.* A very thin stratum or coat.
- Peltate.* Having the stalk attached to some part of the surface or disc, and not the margin. Fig. 97.
- Pendulous.* Hanging down.
- Pencilled.* Ending like a painter's pencil or brush.
- Pentandrous.* Having five stamens. Ex. Class Pentandria, *Violet*.
- Perennial.* Lasting more than two years. Ex. Oak, Rosebush.
- Perfect flower.* One which possesses stamens and pistils, and produces fruit.
- Perfoliate.* Surrounding the stem on all sides, and perforated by it. It differs from connate in not consisting of two leaves. Ex. *Eupatorium perfoliatum*.
- Perianth.* A sort of calyx which is immediately contiguous to the other parts of fructification. Fig. 8.
- Pericarp.* A seed-vessel, or whatever contains the seed. Ex. Pea-pod, p. 42.
- Permanent.* See *Persistent*.
- Persistent.* Not falling off. Those parts of a flower are persistent which remain till the fruit is ripe.
- Perigynous.* Inserted into the calyx.
- Personate.* Masked. Having the mouth of the corolla closed by a prominent palate. Fig. 19.
- Petal.* The leaf of a corolla, usually colored. Fig. 21.
- Petaloid.* Resembling petals.
- Petiole.* The stalk which supports a leaf. Fig. 102.
- Phænogamous.* Not Cryptogamous. Applied to all plants which have visible stamens or pistils. Ex. Lily, Apple.
- Pilose.* Hairy. With a stiff pubescence.
- Pinnæ.* The leaflets or divisions of a pinnate leaf. Ex. Cassia.
- Pinnate.* A leaf is pinnate when the leaflets are arranged in two rows on the sides of a common petiole; as in *Rhus vernix*. Fig. 87.

- Pinnatifid.* Cut in a pinnate manner. It differs from pinnate in consisting of a simple or continuous leaf, not compound. Fig. 65.
- Pistil.* A constituent part of a flower, including the germ, style, and stigma. In a regular flower, it forms the central part.
- Pistillate.* Having pistils, but no stamens.
- Plaited.* Folded like a ruffle or fan; as the leaves of *Vera-trum viride*. Fig. 81.
- Plumose.* Feathery. Feather-like.
- Plumula.* Part of the corculum of a seed, which afterwards forms a new plant with the exception of a root.
- Pod.* A dry seed-vessel, not pulpy; most commonly applied to legumes and siliques.
- Pointal.* See *Pistil*.
- Polyadelphous.* Belonging to the class Polyadelphia, in which the stamens are united into several parcels. Ex. *Hypericum*, (*St. John's wort*.)
- Polyandrous.* Having many disconnected stamens inserted into the receptacle. Ex. Water Lily.
- Polycotyledonous.* Having seeds with more than two cotyledons.
- Polygamous.* Having some flowers which are perfect, and others which have stamens only, or pistils only.
- Polygynous.* Having many styles.
- Polymorphous.* Changeable. Assuming a variety of forms.
- Polypetalous.* Having many petals. Ex. The Rose.
- Polyphyllous.* Having many leaves.
- Pome.* A pulpy fruit having a capsule within it; as the Apple. Fig. 40.
- Premorse.* Bitten off. The same as *abrupt*.
- Prickle.* The prickle differs from the thorn in being fixed to the bark only, and not to the wood. Fig. 127.
- Prismatic.* Having several parallel, flat sides.
- Procumbent.* Lying on the ground.
- Proliferous.* An umbel or flower is said to be proliferous when it has smaller ones growing out of it.
- Pseudopinnate.* Falsely or imperfectly pinnate.
- Pubescent.* Hairy or downy. Ex. Mullein.
- Pulp.* The soft, juicy, cellular substance found in berries and similar fruits.
- Pulpy.* Filled with pulp. Ex. Orange.
- Pulverulent.* Dusty. Composed of powder, or appearing as if covered with it.

- Punctate.* Appearing as if pricked full of small holes, or dots. Ex. *Hypericum*.
- Punctiform.* Resembling dots.
- Pungent.* Sharp, acrid, pricking.
- Putamen.* The inner part of a hard pericarp. Ex. Peach-stone.
- Pyriform.* Shaped like a pear.
- Quadrifid.* Divided four times.
- Quaternate.* Four together.
- Quinate.* Five together.
- Quinquefid.* Divided into five parts.
- Raceme.* A cluster; a kind of inflorescence, in which the flowers are arranged by simple pedicels on the sides of a common peduncle. Fig. 31.
- Rachis.* The common stalk to which the florets and spikelets of grasses are attached. Also the midrib of some leaves and fronds.
- Radiate.* Having ligulate florets placed like rays at the circumference, as in certain compound flowers; or having the outer petals largest, as in certain cymes and umbels. Ex. *Aster*.
- Radical.* Growing immediately from the root. Ex. *Dandelion*. Fig. 93.
- Radicle.* The part of the corculum which afterwards forms the root. Also the minute branch of the root. Fig. 143.
- Ray.* The diverging florets or petals which form the outside of radiate flowers, cymes and umbels. Ex. *Helianthus*.
- Receptacle.* The end of a flower-stalk, being the base to which most or all the parts of fructification are attached.
- Reclined or Reclining.* Bending over, with one end inclining toward the ground.
- Recurved.* Curved backwards.
- Reflexed.* Bent backward, more than recurved.
- Reniform.* Kidney-shaped. Heart-shaped, without the point. Fig. 56.
- Repand.* Slightly wavy or serpentine at the edge; as the leaves of *Menyanthes trifoliata*.
- Resupinate.* Turned upside-down; as the leaves of *Juniperus communis*.
- Reticulate.* Net-like. Having veins distributed like net-work. Fig. 79.

Retuse. Having a slight sinus, or superficial notch in the end. Less than emarginate.

Revolute. Rolled backward or outward.

Rhomboidal. Having four sides with unequal angles.

Ribbed. Marked with parallel ridges or veins. Fig. 78.

Ringent. Irregular, with an upper and under lip. See *labiate*.

Rooting. Sending out lateral roots.

Rostellum. See *radicle*.

Rostrate. Furnished with a beak. Ex. Fruit of the *Geraniums*.

Rotate. Wheel-shaped. Flat, without a tube; as in the flowers of *Solanum dulcamara*. Fig. 18.

Rugose. Wrinkled. Fig. 80.

Runcinate. Having large teeth pointing backward; as the leaves of the *dandelion*. Fig. 62.

Saccate. Having a bag or pouch.

Sagittate. Arrow-shaped. Like the head of an arrow. Fig. 61.

Salver-shaped. See *Hypocrateriform*.

Samara. A seed-vessel not opening by valves, having a winged or membranous appendage.

Sarmentose. Running on the ground and striking roots from the joints, as the *Strawberry*.

Sarcocarp. The hard, or bony part of a nut or shell.

Scape. A stalk which springs from the root, and supports flowers and fruit, but no leaves.

Scabrous. Rough.

Scarious. Having a thin, membranous margin.

Scions. Lateral shoots or offsets from the root.

Scrobiculate. Covered with deep, round pits.

Seed-vessel. A vessel enclosing the seed.

Seed. That part of the plant which propagates the species.

Segment. A part or principal division of a leaf, calyx or corolla.

Semibivalvular. Half divided into two valves.

Seminal leaves. The first leaves of a plant, or those formed from the cotyledons.

Sepals. The segments of the calyx.

Sericeous. Silky.

Serrate. Notched like the teeth of a saw, the points tending upward; as in the *Strawberry* and *Rose* leaves. Fig. 70.

Serrulate. Minutely serrate.

Sessile. Placed immediately on the stem, without the intervention of a stalk; as the leaves of the *Spigellia Marylandica*.

Setaceous. Bristle-like.

Sheath. A tubular or folded leafy portion, enclosing the stem.

Silicle. A seed-vessel constructed like a silique, but not longer than it is broad. Fig. 39.

Siliqua. A long pod or seed-vessel of two valves, having its seeds attached to the two edges alternately. Fig. 38.

Siliquose. Having siliques.

Simple. Not divided, branched, or compounded.

Sinuate. Having sinuses at the edge. Fig. 64.

Sinus. A large rounded indentation or cavity.

Sori. Plural of *Sorus*. The most common fruit of Ferns, consisting of small clusters of minute capsules on the back of the leaf.

Spadix. An elongated receptacle of flowers, commonly proceeding from a spathe, as in *Arum triphyllum*. Fig. 36.

Spathe. A sheathing calyx opening lengthwise on one side and consisting of one or more valves. See Spadix.

Spatulate, or spathulate. Obtuse or large at the end, and gradually tapering into a stalk at base, as in the leaves of *Statice Caroliniana*.

Species. A group or sub-division of plants agreeing with each other not only in their fructification, but in all other essential and permanent parts; and always re-producing the same kind.

Specific. Belonging to a species only.

Spike. A kind of inflorescence in which the flowers are sessile or nearly so on the sides of a long peduncle. Fig. 32.

Spikelet. A small spike.

Spindle-shaped. See Fusiform. Fig. 111.

Spine. A thorn or sharp process growing from the wood. Fig. 126.

Spur. A sharp hollow projection from a flower, commonly the nectary. Fig. 24.

Squamiform. Scale-shaped.

Squarrose, or Squarrous. Ragged. Having reflected or divergent scales.

Stamen. The part of the flower on which the Linnæan classes are founded. It commonly consists of the *filament*, or stalk, and the anther which contains the *pollen*. Fig. 4.

Staminate. Having stamens but no pistils.

Standard. See *Banner*.

Stellate. Like a star. Fig. 96.

Stem. A general supporter of leaves, flowers and fruit.

Stemless. Having no stem, properly so called, but only a scape.

Sterile. Barren.

Stigma. The summit or extremity of the pistil. Fig. 5.

Stipe. The stem of a fern, or fungus; also the stem of the down of seeds; also a particular stalk of germs, seeds, &c., which is superadded to the pedicel.

Stipitate. Supported by a stipe.

Stipule. A leafy appendage situated at the base of petioles or leaves. Fig. 123.

Stipular. Belonging to stipules.

Stoloniferous. Having scions or running shoots. Ex. Indian corn.

Striate. Marked with fine parallel lines.

Strigose. Bristly.

Strobile. A cone; an ament with woody or rigid scales, as in the fruit of pines, firs, &c. Fig. 46.

Style. The part of the pistil which is between the germ and stigma. Fig. 5.

Sub. A particle prefixed to various terms, to imply the existence of a quality in a diminutive or inferior degree, as

Subacute. Somewhat acute. Less than acute, &c.

Subsessile. Nearly sessile.

Subserrate. Slightly serrate, &c.

Subulate. Awl-shaped. Narrow, stiff and sharp-pointed. Fig. 55.

Succulent. Juicy. Ex. Peach, Orange.

Sucker. A shoot from the root, or lower part of the stem.

Suffruticose. Somewhat shrubby. Shrubby at base.

Sulcate. Furrowed.

Supradecomposed. More than decomposed. Many times subdivided.

Suture. The line or seam formed by the junction of two valves of a seed-vessel. Fig. 38.

Tendril. A filiform appendage of certain vines, which supports them by twining round other objects.

Tereete. Round, cylindrical.

Terminal. Extreme, situated at the end.

Ternate. Three together, as the leaves of *Menyanthes trifoliata*.

Tetradynamous. Having four long and two short stamens.

Tetrandrous. Having four stamens.

Thorn. See spine.

Throat. The passage into the tube of a corolla.

Thyrse. A close, compact panicle.

Tomentose. Downy. Covered with fine matted pubescence.

Triandrous. With three stamens.

Trifid. Three-cleft.

Trifoliate. Three-leaved. See *Ternate*.

Trilobate. Three-lobed.

Trilocular. Three-celled.

Tripartite. Three-parted.

Trivial name. The specific name.

Truncate. Having a blunt termination as if cut off, as the leaves of *Liriodendron tulipifera*.

Tuber. A solid, fleshy knob.

Tuberous. Thick and fleshy, containing tubers; as the roots of the Potato, Pæony, &c.

Tubular. Shaped like a tube. In a compound flower, the florets which are not ligulate, are called tubular.

Tunicated. Coated with concentric layers; as the Onion.

Turbinate. Shaped like a top or pear.

Umbel. A kind of inflorescence in which the flower-stalks diverge from one centre, like rays; as in *Conium Maculatum*.

Umbelliferous. Bearing umbels.

Umbilicate. Marked with a central depression.

Unarmed. Without prickles or thorns.

Uncinate. Hooked, hook-shaped.

Undulated. Wavy, serpentine, gently rising and falling.

Unguiculate. Inserted by a claw.

Unilateral. Growing all on one side, or with the flowers leaning to one side.

Urceolate. Pitcher-shaped. Swelling in the middle; and slightly contracted at top.

Valves. The segments or parts of a seed-vessel, into which it finally separates. Also the leaves which make up the glume or spathe.

Vasculares. Plants with spiral vessels, woody stems, and

reticulated leaves, one of the divisions of Lindley's system.

Variety. A subdivision of a species, distinguished only by characters which are not permanent; and which does not with certainty reproduce its kind; as the varieties of *tulips*, *peaches*, &c.

Vaulted. Arched over, with a concave covering.

Veined. Having the divisions of the petiole irregularly branched on the under side of the leaf.

Ventricose. Swelling. Inflated.

Verrucose. Warty. Covered with little protuberances.

Vertical. Perpendicular.

Verticillate. Whorled. Having leaves given off in a circle round the stem.

Vesicular. Made of vesicles or little bladders.

Villous. Hairy, the hairs long and soft.

Virgate. Long and slender. Wand-like.

Virose. Poisonous, nauseous and strong to the smell.

Viscid. Thick, glutinous, covered with adhesive juice.

Visellus. A part of certain seeds distinct from the albumen, but not rising out of the ground at germination.

Viviparous. Producing a collateral offspring by means of bulbs.

Wedge-shaped. Formed like a wedge, and commonly rounded at the largest end.

Wheel-shaped. See *Rotate*.

Wings. The two lateral petals of a papilionaceous flower.

Winged. Having the sides extended into a leafy expansion.

